Semi-Annual Meeting, St. Louis, Missouri, November 29-30, 1953

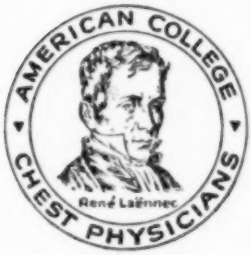
VOLUME XXIV NUMBER 5

DISEASES

of the

CHEST

OFFICIAL PUBLICATION



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1. Meakins, J. C.: The Practice of Medicine, ed. 5, St. Louis, The C. V. Mosby Company, 1950, p. 154.
2. *Ibid.*, p. 288.
3. Bishop, P. A., and Lindskog, G. E.: Lung Abscess, in Pillmore, G. U.: Clinical Radiology, Philadelphia, F. A. Davis Company, 1950, vol. 1, p. 339.

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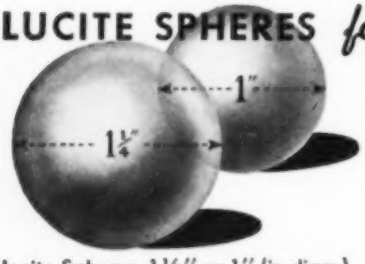

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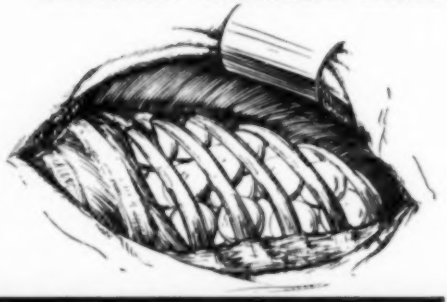

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1. Hobby, G. L., Lenert, T. F., Rivoire, Z. C., Donikian, M., and Pikuls, D.: Am. Rev. Tuberc. 67:808, 1953.

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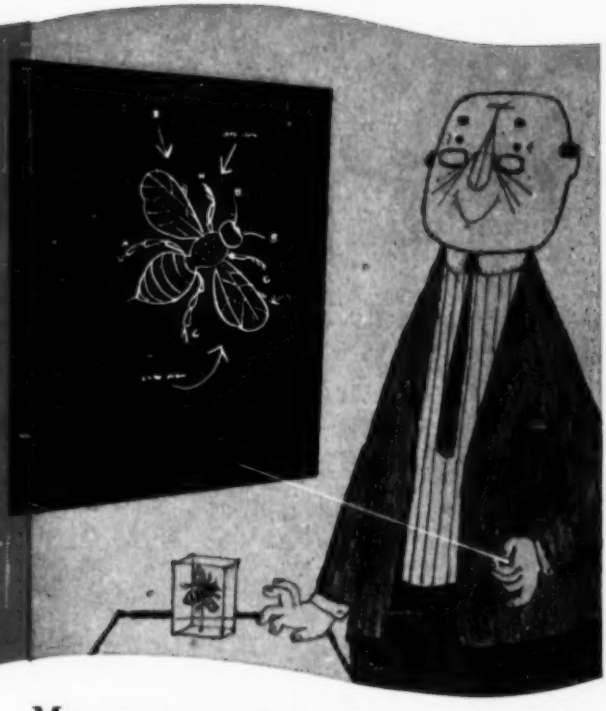

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1. Kaufman, R., and Farmer, L. (1951) Norisodrine by Aerohalor in Asthma, Ann. Allergy, 9:89, Jan.-Feb.
2. Swartz, H. (1950), Norisodrine Sulphate (25 Per Cent) Dust Inhalation in Severe Asthma, Ann. Allergy, 8:488, July-August.
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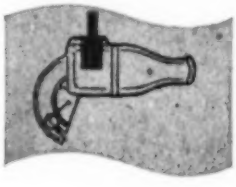

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1. Boger, et al.: Oral Penicillin: Evaluation of All Forms, report distributed at New York Session of the A.M.A., 1953.

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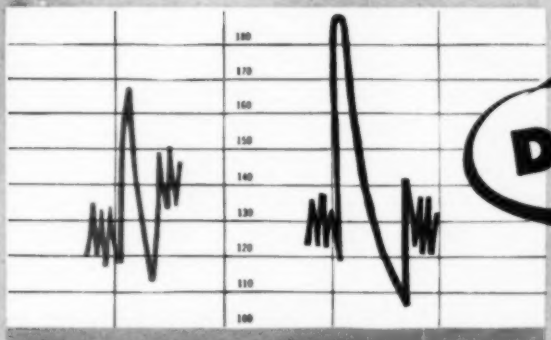

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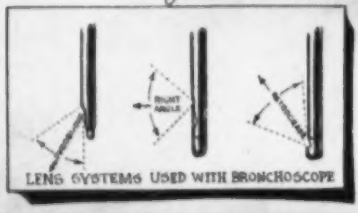

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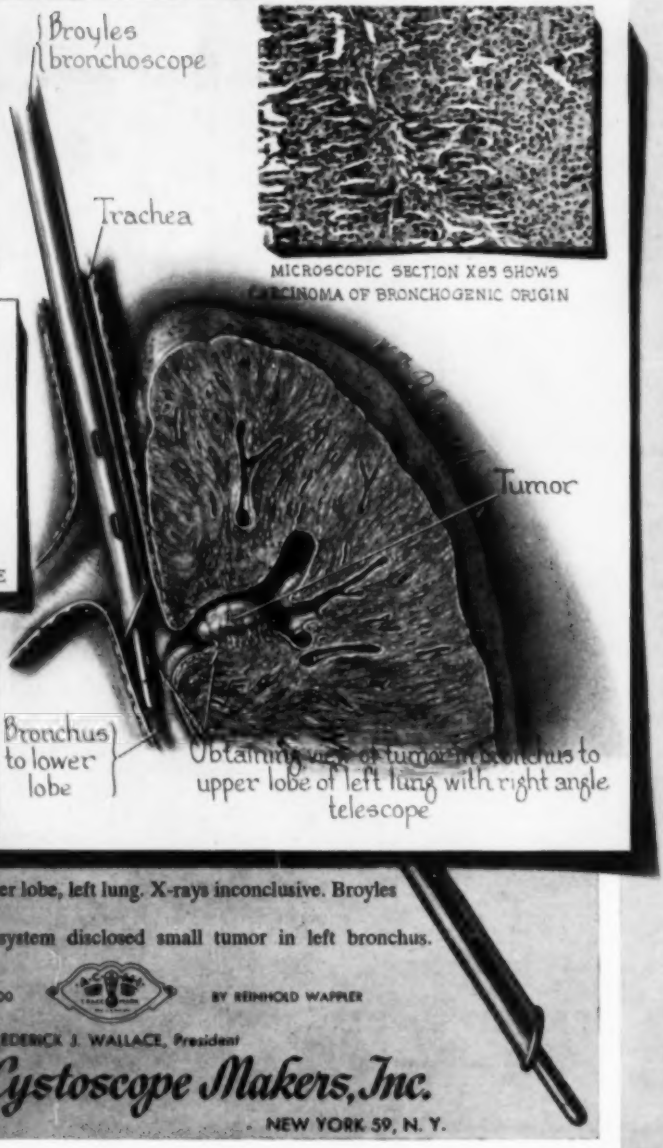
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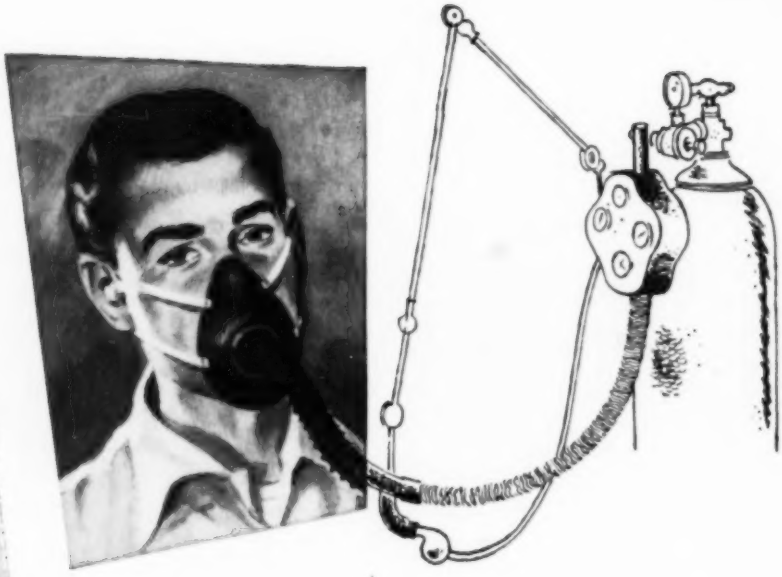

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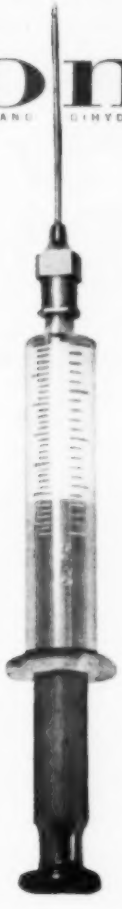

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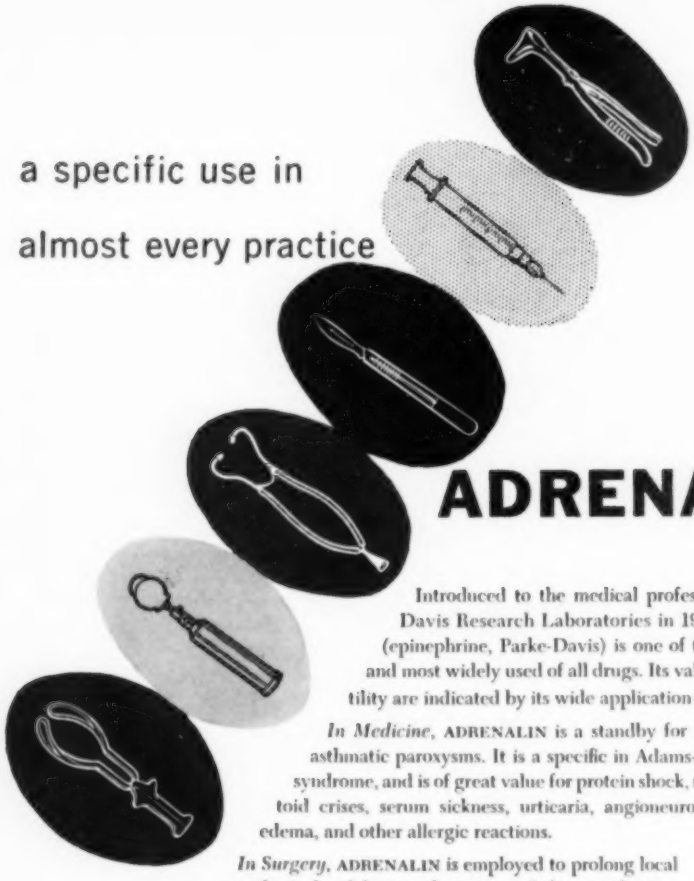

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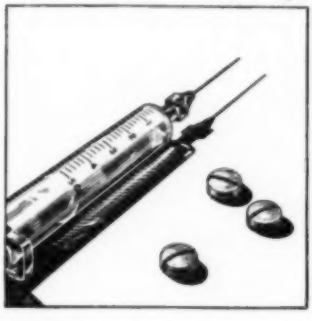

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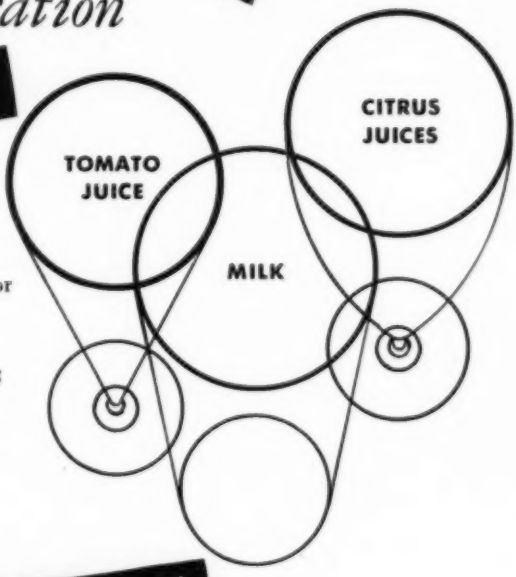

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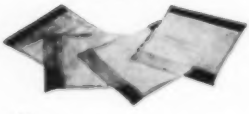

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VOLUME XXIV NOVEMBER 1953 NUMBER 5

Angiocardiography In Diseases of the Chest*

ISRAEL STEINBERG, M.D., F.C.C.P.
New York, New York

FOREWORD

Over 15 years have elapsed since the practical method of angiocardiography was published.[1] During that time many reports of its use in congenital and acquired heart, pulmonary and mediastinal diseases have appeared from all over the world. Four important monographs on these subjects have been published.[2-5] Angiocardiography has fully lived up to the expectations formulated in 1940.[6]

In this number of Diseases of the Chest, four papers representing some of the current clinical problems encountered at the New York Hospital—Cornell Medical Center, which angiocardiography has helped evaluate, are reported. The first, by Doctors Lukas, Dubilier and Steinberg, "Persistence of the left superior vena cava," is mostly of academic interest. The embryology, anatomy and cadaver dissection incidence of this congenital cardiovascular anomaly are described and the findings during life by angiocardiography and cardiac catheterization are illustrated.

Doctors Miscall and Duffy discuss the role that angiocardiography plays in the selection of cases for surgical treatment of pulmonary cysts and bullae. They emphasize that angiocardiography because it assesses pulmonary circulation so vividly is valuable in revealing the amount of compressed pulmonary tissue that is surgically restorable. The use of angiocardiography for study of the pulmonary circulation antedates its application in heart disease.[7] Correlative studies showing its value as compared to pulmonary function, especially bronchospirometry, are also beginning to be published[5,8] and the findings are significant. The third paper, by Doctors Finby and Steinberg reiterates the value of angiocardiography in predicting serious cardiovascular involvement in malignant mediastinal disease. Finally, three cases of interatrial tumor (myxoma), the first to be recognized during life, are described and illustrated by Doctors Glenn, Dotter and Steinberg. Angiocardiography by establishing the diagnosis blazes the trail for curative treatment of this disease.

No longer is angiocardiography to be considered a research tool. Its value in clinical medicine especially in lung and heart disease has been amply

*From the Departments of Radiology and Medicine of the New York Hospital—Cornell Medical Center.

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demonstrated.[4] It is predicted that like bronchoscopy and Papanicolaou sputum studies in obscure pulmonary disease, it will become routine, particularly in the evaluation of lung cancer operability.[9] Technical advances going on all over the world will also enhance the value of angiocardiography in congenital heart disease.[10,11] Wilson and co-workers have also shown that adding a minute dose of an inert radioisotope to the contrast substance injected according to angiocardiographic technic makes it possible to determine maximal opacification of the abdominal aorta. This may replace the Dos Santos translumbar aortic puncture method of abdominal aortography.[12] Finally, Evans and co-workers at this center have utilized the Robb-Steinberg method of injection to visualize the opacified kidney by tomography.[13] This method, called nephrotomography, differentiates between renal cysts and tumors.

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Persistence of Left Superior Vena Cava*

ISRAEL STEINBERG, M.D., F.C.C.P., WILLIAM DUBILIER, JR., M.D.
and DANIEL S. LUKAS, M.D.
New York, New York

Persistence of a left superior vena cava is a congenital anomaly of considerable interest but by itself exerts no apparent adverse affect on cardiac function. It may occur as an isolated lesion but more often it is associated with many congenital cardiac anomalies. Heretofore it could only be discovered at autopsy or cadaver dissection, but angiocardiography and cardiac catheterization have made possible its recognition during life. This report is a summary of the findings of 11 cases detected by these methods at this center.

Embryology

In early development, the cephalic portion of the embryo is drained by bilateral symmetrical right and left anterior cardinal veins. These join the posterior cardinal veins near the heart and form the right and left ducts of Cuvier which enter the sinus venosus (Figure 1A). During the eighth week of fetal life, an oblique communication forms between the anterior cardinal veins and shunts blood from the left vein to the right. This vessel becomes the left innominate vein. The development of the left innominate vein is followed by atrophy of the left anterior cardinal vein. It normally persists as the first left intercostal vein. The left duct of Cuvier persists as the oblique vein of the left atrium which enters the coronary sinus. The latter structure is derived from the left half of the sinus venosus. The right duct of Cuvier normally becomes the superior vena cava (Figure 1B). The fully developed superior vena caval system is demonstrated in Figure 2.

If the left innominate vein fails to develop, the left anterior cardinal vein persists and continues to drain the left brachiocephalic veins. In this situation it becomes the left superior vena cava. Since the left duct of Cuvier empties into the left half of the sinus venosus which ultimately becomes the coronary sinus, a persistent left superior vena cava drains into this structure (Figure 1B).[1-3]

Review of Literature

Maude Abbott[4] records nine cases of persistent left superior vena cava among 1,000 cases of congenital heart disease. McCotter in 1916[5] reported three additional cases and upon review of the anatomic literature collected a total of 120 cases. In 1939 Chouke[6] thoroughly reviewed the literature and recorded a total of 205 cases. In 1946 Sanders[7] added a case and reported the total number to be 215 and estimated the incidence to be 1 in 348 cadavers.

*From the Departments of Medicine, Radiology and the Cardio-Pulmonary Laboratory, the New York Hospital—Cornell Medical Center.

Aided by grants from the Mallinckrodt Chemical Works, the New York Heart Association and the New York Hospital—Cornell Medical Center Research Fund.

In the angiocardiographic literature, Sussman and Brahms[8] illustrated a case of double superior vena cava and in another publication[9] recorded two instances of coronary sinus visualization with probable reflux filling of the terminal end of a persistent left superior vena cava. Cooley and co-workers[10] reported two cases of persistent left superior vena cava associated with congenital heart disease. A case diagnosed by angiocardiography and cardiac catheterization was also reported from this center.[11] Other cases diagnosed by angiocardiography appear in a recent publication.[12] Cournand and co-workers demonstrated a left superior vena cava in a patient with bilateral superior venae cavae and dextrocardia during cardiac catheterization.[13]

Classification and Case Reports

Persistence of the left superior vena cava may be classified into three groups: (1) bilateral superior venae cavae without other congenital cardiac anomalies; (2) bilateral superior venae cavae with associated congenital cardiac anomalies; and (3) absence of the right superior vena cava (Table

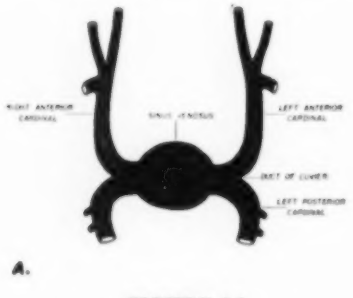

FIGURE 1A

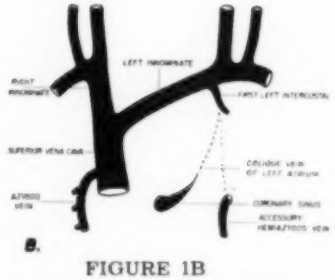

FIGURE 1B

Figure 1: Embryological development of the vena caval systems. *A.* Early and *B.* Late. (Modified from Gray's Anatomy[1]).

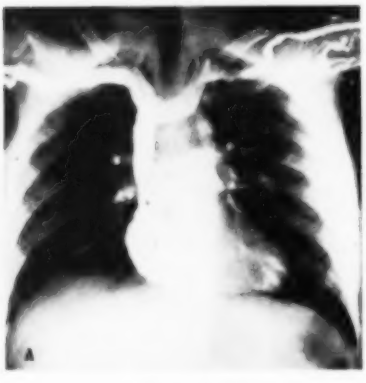

FIGURE 2A

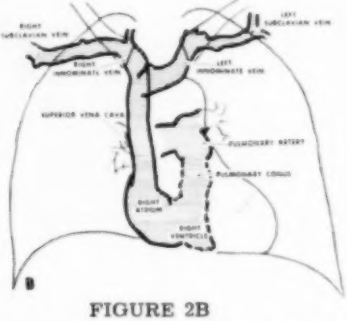

FIGURE 2B

Figure 2: A. Angiocardiogram demonstrating normal superior vena cava and tributaries (simultaneous bilateral arm injection). *B.* Tracing.

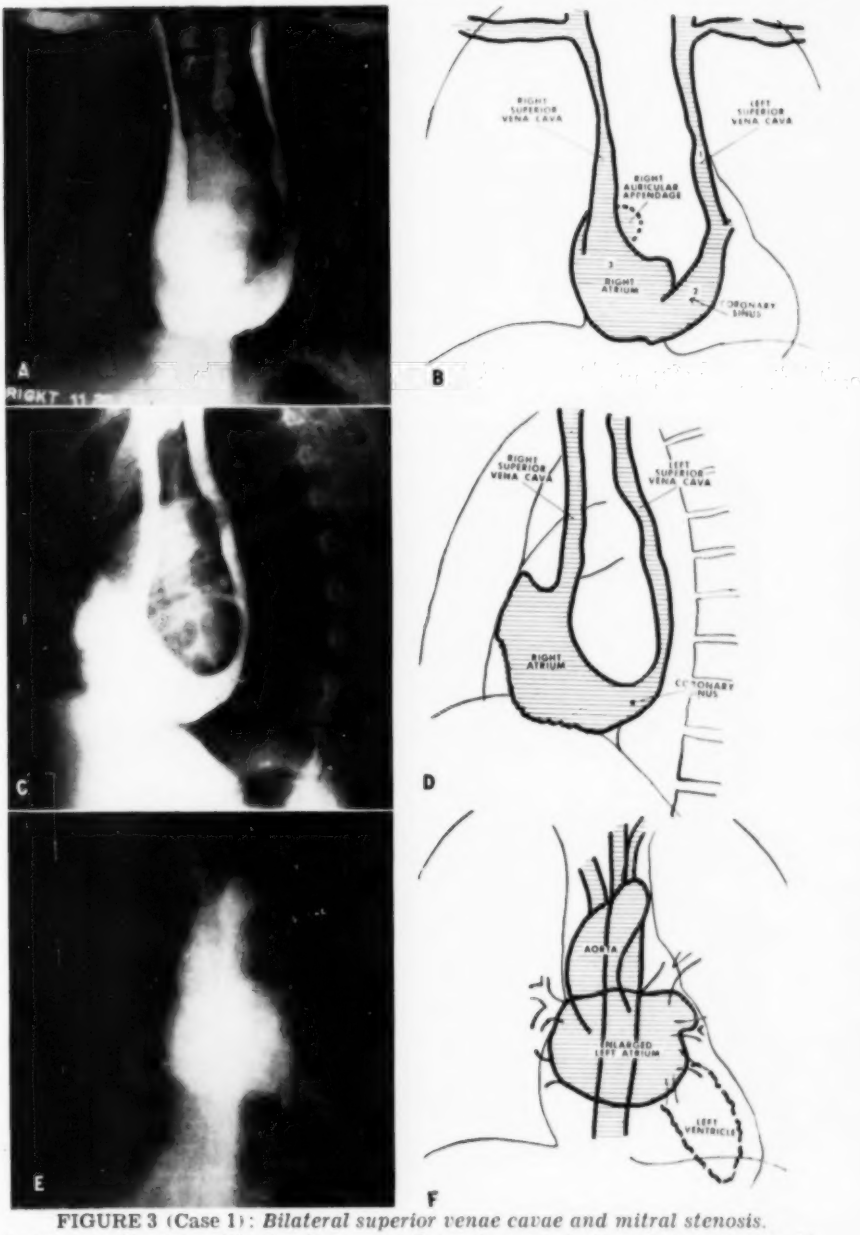

FIGURE 3 (Case 1): *Bilateral superior venae cavae and mitral stenosis.*

A. Angiocardiogram with simultaneous bilateral arm injection demonstrating bilateral superior venae cavae.—*B. Tracing of A.* Cardiac catheterization revealed blood oxygen contents in volumes per cent at position 1- 13.1; at position 2- 9.6 (46 per cent saturation); at position 3- 15.1.—*C. Angiocardiogram,* left oblique projection, showing bilateral superior venae cavae.—*D. Tracing of C.*—*E. Angiocardiogram* showing the enlarged left atrium of mitral stenosis.—*F. Tracing of E.*

I). In group I, three cases were encountered and an illustrative case (Case 1) is reported. In group II, seven cases were studied and the wide variety of associated lesions can be noted in the table. The one case in group III is unique in that a right superior vena cava was absent.

Several variations of bilateral superior venae cavae were encountered. The commonest variety consisted of separate bilateral systems with no intercommunication (Figures 3, 5A, 5B). Another variation consisted of a rudimentary intercommunicating innominate vein which allowed opacification during angiocardiography of both superior venae cavae (Figure 4C). Another type showed only a rudimentary left superior vena cava, and most of the blood from the left side passed to the right superior vena cava via a large left innominate vein (Figure 5C). One case showed double azygos veins as well as double superior venae cavae (Figure 5D). This anomaly has been described six times in the anatomical literature.[7] A left superior vena cava which draines the entire venous brachiocephalic system

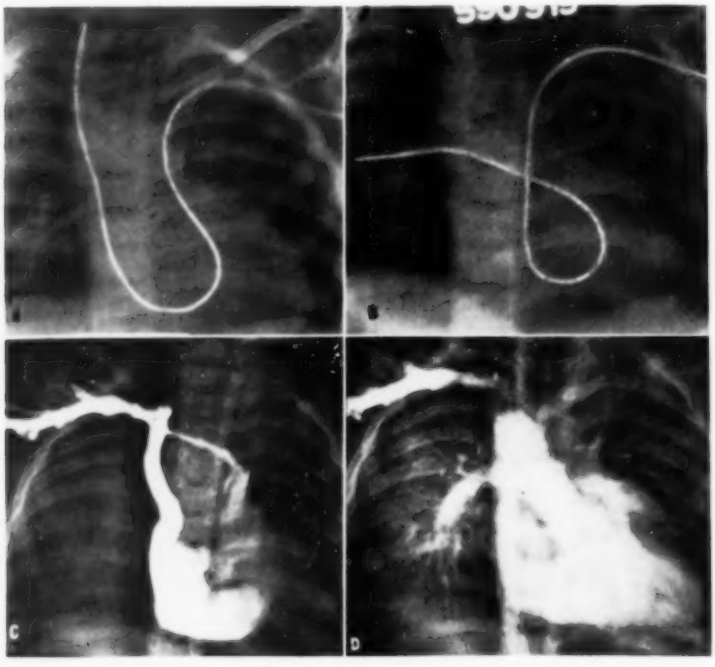

FIGURE 4 (Case 5): *Complex cyanotic congenital heart disease.*

A. Course of catheter (retouched) through left superior vena cava into right atrium and out into right superior vena cava. Oxygen contents of both right and left superior vena cava blood were 19.3 volumes per cent.—*B*. Catheter (retouched) passed through interatrial defect into left atrium and a right pulmonary vein.—*C*. *Angiocardiogram* showing bilateral superior venae cavae. The left is filled by an intercommunicating rudimentary innominate vein.—*D*. Later phase demonstarting complex cardiac anomalies with overriding aorta, pulmonary stenosis and intracardiac shunts.

without a corresponding right is seen in Figure 6. Twenty cases of this rare variation have been reported previously.[14,15]

Illustrative Case (Case 1, Table I):

A 33 year old woman with well documented severe mitral stenosis was admitted for mitral valvulotomy. Cardiac catheterization was performed for preoperative evaluation. The catheter was introduced into the left median basilic vein. In the thorax it was observed to pursue an anomalous course along the left cardiac border from whence it could be directed into the right atrium. Blood samples

TABLE I

CLASSIFICATION OF PERSISTENT LEFT SUPERIOR VENA CAVA

Case Number	Age-Sex	Diagnosis	How Demonstrated
GROUP I: *Bilateral superior venae cavae without other congenital cardiac lesions:*			
(1) 26643	33 F	Rheumatic heart disease Mitral stenosis	Cardiac catheterization Angiocardiography (Figure 3)
(2) 306716	43 F	Syphilitic aortitis	Angiocardiography
(3) 552360	49 F	Thymoma	Angiocardiography
GROUP II: *Bilateral superior venae cavae associated with other congenital heart lesions:*			
(4) 561178	4 M	Situs inversus Dextracardia Tricuspid atresia Common atrium	Cardiac catheterization
(5) 590919	4 M	Situs inversus with levocardia Interatrial and interventricular septal defects Infundibular pulmonary stenosis Transposition of great vessels	Cardiac catheterization Angiocardiography (Figure 4)
(6) 560278	21 F	Single atrium Single ventricle Dextraposition of aorta Congenital mitral stenosis	Angiocardiography (Figure 5D) Autopsy
(7) 517038	4 M	Tricuspid atresia Interatrial septal defect	Cardiac catheterization (11)
(8) 574367	3 F	Tetralagy of Fallot	Angiocardiography (Figure 5B)
(9) 492621	6 F	Tetralagy of Fallot Interatrial septal defect	Angiocardiography (Figure 5C)
(10) 496509	30 F	Infundibular pulmonic stenosis Post stenotic dilatation of pulmonary arteries and branches	Angiocardiography (Figure 5A)
GROUP III: *Persistent left superior vena cava without a right superior vena cava:*			
(11) 619508	21 M	No other cardiovascular abnormalities	Angiocardiography (Figure 6)

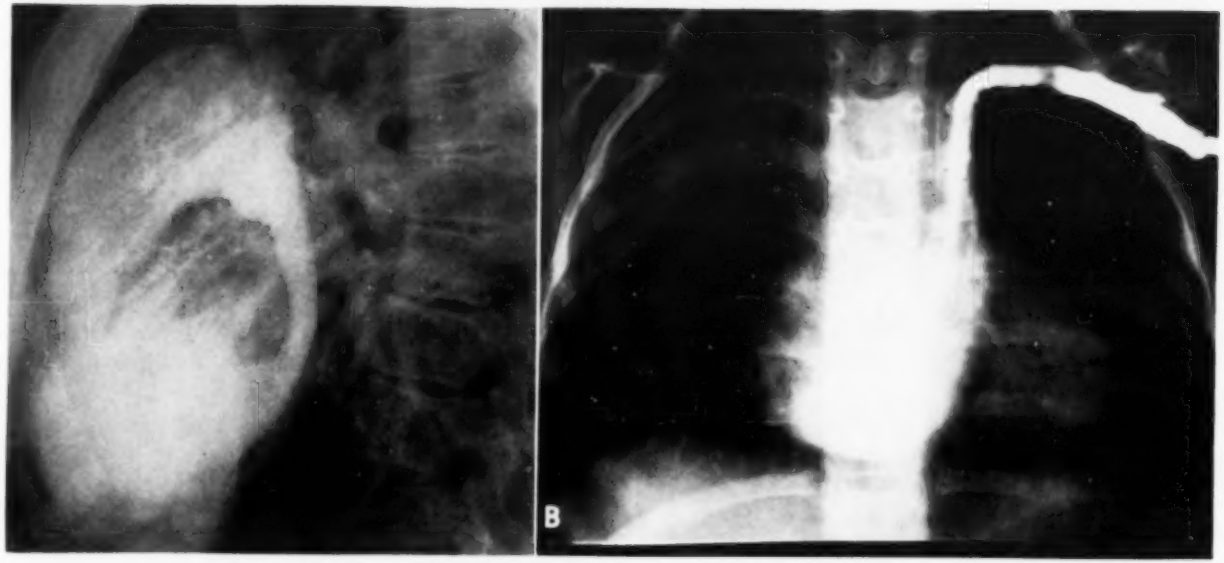

FIGURE 5A FIGURE 5B

FIGURE 5: Four angiocardiograms showing persistent left superior vena cava.

A. (Case 10): *Lateral angiocardiogram:* left vena cava enters coronary sinus. Pulmonic stenosis.

B. (Case 8): Left superior vena cava. Tetralogy of Fallot.

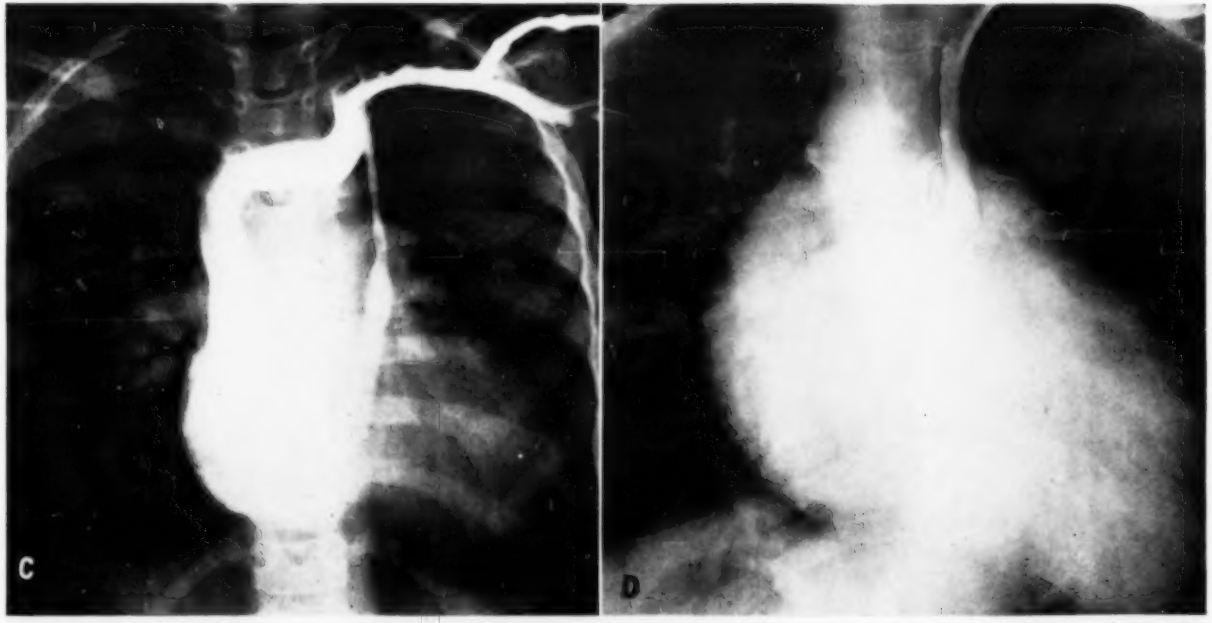

FIGURE 5C FIGURE 5D

FIGURE 5: Four angiocardiograms showing persistent left superior vena cava.

C. (Case 9): Rudimentary left superior vena cava. Tetralogy of Fallot.

D. (Case 6): *Complex cyanotic congenital heart disease.* Bilateral azygos veins, bilateral superior venae cavae and cor biloculare. The right superior vena cava is not seen.

taken from various sites along this course (Figure 3B) revealed oxygen contents compatible with superior vena caval blood (position 1), coronary sinus blood (position 2), and right atrial blood (position 3). These findings established the presence of a left superior vena cava, that terminated in the coronary sinus. No other congenital defects were identified and a hemodynamic pattern typical of mitral stenosis with marked pulmonary vascular sclerosis was observed. Angiocardiography made by simultaneous injection of both arms with contrast materials confirmed the presence of bilateral superior venae cavae (Figures 3A, B, C, D). The typical enlarged left atrium of rheumatic heart disease was also demonstrated (Figures 3E, F). At operation (Dr. Frank Glenn) the anomalous left superior vena cava was observed and, because of its location along the posterior surface of the left atrium, did not interfere with the procedure.

FIGURE 6 (Case 11): *Angiocardiogram:* persistent left superior vena cava, absent right superior vena cava.

Comment

Unlike many congenital cardiac lesions that defy understanding, persistence of a left superior vena cava is a relatively simple development defect. Fortunately, its occurrence results in no complication aside from the fact that it may occasionally simulate widening of the aorta during roentgenography of the heart.[16] The association of persistence of left superior

vena cava with complex cyanotic types of congenital cardiovascular disease is, however, noteworthy (Figures 4, 5).

Although a left superior vena cava may be suspected on fluoroscopy it can be positively identified in the living patient only by angiocardiography or cardiac catheterization. A left superior vena cava may be missed during angiocardiography unless the left arm veins are used for the injection of contrast substances. Even though 11 cases were found at this center, many more were probably missed because injection of the right arm for angiocardiography is preferred since this simplifies positioning of the patient for left oblique and lateral studies of the heart.[17]

Catheterization of the heart via the left arm veins, routinely used at this center, affords the opportunity of entering a left superior vena cava. In some of our cases, however, demonstration of the left superior vena cava could be accomplished by catheterization of the right superior vena cava. In these instances the catheter passed through the right superior vena cava, the right atrium, into the coronary sinus, and up the left superior vena cava.

SUMMARY AND CONCLUSION

Eleven cases of persistent left superior vena cava discovered during life by cardiac catheterization and angiocardiography are described and illustrated. By itself, a persistent left superior vena cava produces no detectable effects on the function of the heart but it is often associated with other congenital cardiac anomalies often of a multiple complex type.

RESUMEN

Se describen y se ilustran once casos de vena cava superior izquierda persistente, descubiertos durante la vida por la cateterización cardiaca y la angiocardiografía. Por si misma la vena izquierda persistente, no produce efecto apreciable en la función del corazón, pero se asocia a menudo con otras anomalías congénitas frecuentemente de un tipo múltiple y complejo.

RESUME

Les auteurs décrivent 11 cas de persistance d'une veine-cave supérieure gauche découverte pendant la vie, par cathétérisme cardiaque. A elle-seule, la persistance de la veine-cave supérieure gauche ne produit aucun trouble perceptible de la fonction cardiaque mais elle est souvent associée avec d'autres anomalies cardiaques congénitales, habituellement complexes.

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Surgical Treatment of Bullous Emphysema
Contributions of Angiocardiography*

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Patients with symptoms attributed to the various forms of emphysema, generally have been given a poor prognosis. This has been acceptable when widely disseminated, intrinsic pathological changes have seriously and irreversibly impaired cardio-respiratory function. However, recent experience does not routinely justify such pessimism. Careful correlation of the clinical, pathological and therapeutic data has shown that significant intrinsic changes often have involved only small segments of lung, but through a variety of mechanisms, have frequently and seriously embarrassed total function. Some of the acute and chronic manifestations and potential mortality of such disease processes have responded favorably to surgical correction of the underlying defect. This report is concerned with the diagnostic methods, especially angiocardiography, which facilitate the recognition of bullous emphysema a potentially reversible disease and its surgical treatment.

Types of Bullous Emphysema

The terms pulmonary cyst, aircell, giant bulla, emphysematous bleb more or less characterize a common form which the bullous disease takes. Such lesions are discrete, have thin, transparent walls and, particularly in young individuals, occur singly in small subsegments. In older patients, the close grouping of a number of large and small blebs more frequently destroys major segments or entire lobes. In another form, the excessive but uniformly even progression of the diffuse basic emphysematous change converts an entire lobe into a flimsy voluminous structure consistent with the concept of vanishing lung. The scarcity of discrete cysts is conspicuous in a gossamer honeycomb, in which a pale pink color with deficient pigmentation suggests an early or congenital origin. A third group, presents the constantly serious problem of recurrent, persistent or tension pneumothorax in which the importance of the rupture of small blebs has been clearly demonstrated by Kjaergaard.[1] Microscopic examination of many surgical specimens which have been diagnosed bullous emphysema has yielded constant findings. These include, dilated and collapsed alveoli; ruptured and fibrosed septa; many pigment laden macrophages; thickening of the bronchial and small vessel walls and a predominance of low cuboidal epithelial lining in the cystic areas.

Pathologic Physiology

In bullous emphysema, bronchial obstruction, even of intermittent type, may have serious consequences. Excessive local over-distention caused by

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persistent check-valve type of obstruction in a segment or lobe often has precipitated grave pulmonary symptoms. These have appeared when respiratory function, already reduced by the actual replacement of pulmonary parenchyma by the bullous disease, has been reduced to critical levels by concomitant compression of the remaining lung, i.e., as the bellows action and ventilatory mechanism are impaired, dyspnea appears. Under-ventilation in compressed tissue that continues to be perfused leads to both anoxemia and retention of carbon dioxide. Observations at operation confirms this view. At the base of over-distended segments, single or multiple, patent bronchial communications have been demonstrated. Although the anesthetist has easily over-distended such areas by raising the endobron-

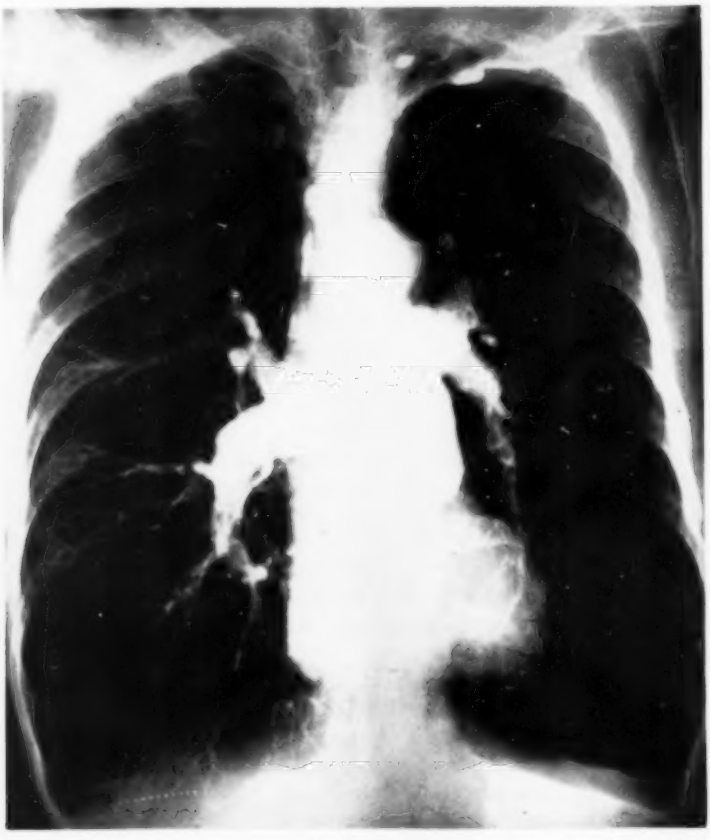

FIGURE 1 (Case 1, J.O.): *Angiocardiogram* showing pulmonary circulation in advanced bilateral bullous emphysema. The patient was totally disabled by cough, expectoration and severe dyspnea. The pulmonary circulation everywhere except at the right base is poor and scant. This patient was able to survive a left spontaneous pneumothorax but succumbed when the right lung collapsed. Angiocardiography in this case indicated that only the right lower lobe had adequate cardio-respiratory function.

chial pressure, manual pressure on an over-distended lung has not always caused deflation, even with the bronchial system widely open to the atmosphere. Spirometric and cardiac catheterization studies lend additional support to this viewpoint and will be the basis of a future report.

The similarity of symptoms and signs which result from the complex pathologic changes usually has defied recognition of the lesions by clinical examination alone. Distressing dyspnea has been a constant complaint. Its cyclic exacerbation with upper respiratory infections has been due to increased obstructive local emphysema constantly aggravated by coughing and excessive, tenacious secretions. Fever, pain, wheezing and asthmatic

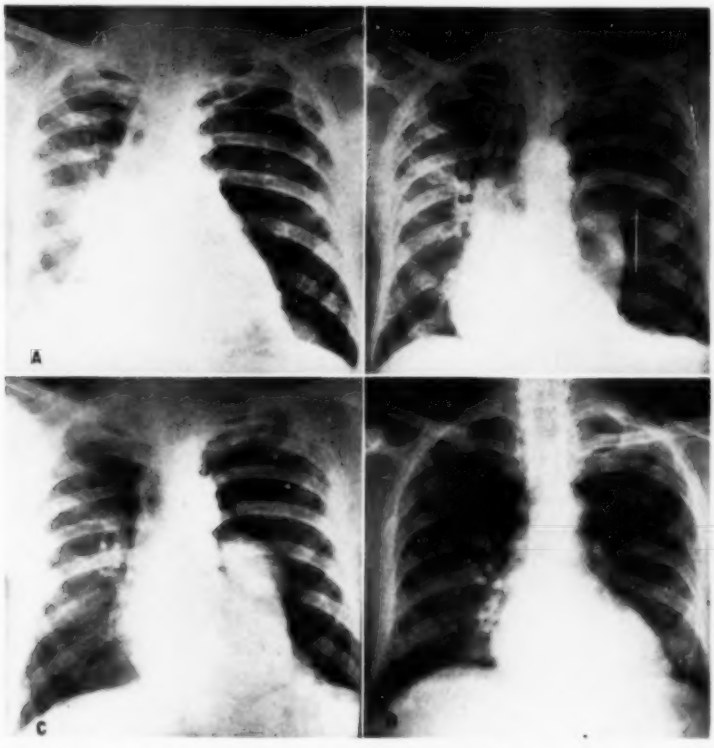

FIGURE 2 (Case 2, D.C.): Male, 44 years old, with left tension pneumothorax due to needle aspiration of huge bullous mistaken for spontaneous pneumothorax.—*A.* (upper left): Heart and mediastinum markedly shifted to right by left tension pneumothorax. Note multiple bullae right upper lung and congestion rest of right lung.—*B.* (upper right): A few days later, left lung cyst reinflated after aspiration of pneumothorax. Left lung remains totally collapsed at hilum.—*C* (lower left): Pneumothorax almost completely re-expanded while pulmonary cyst continues to enlarge and prevent expansion left lung. Subsequent thoracotomy revealed single huge cyst originating from posterior basal segment, right lower lobe. Excision of cyst with division and suture of basal bronchus and blood supply was curative.—*D.* (lower right): Follow-up roentgenogram, three years later, shows normal left lung. Bullae right upper lobe enlarged but patient is asymptomatic after six years follow-up.

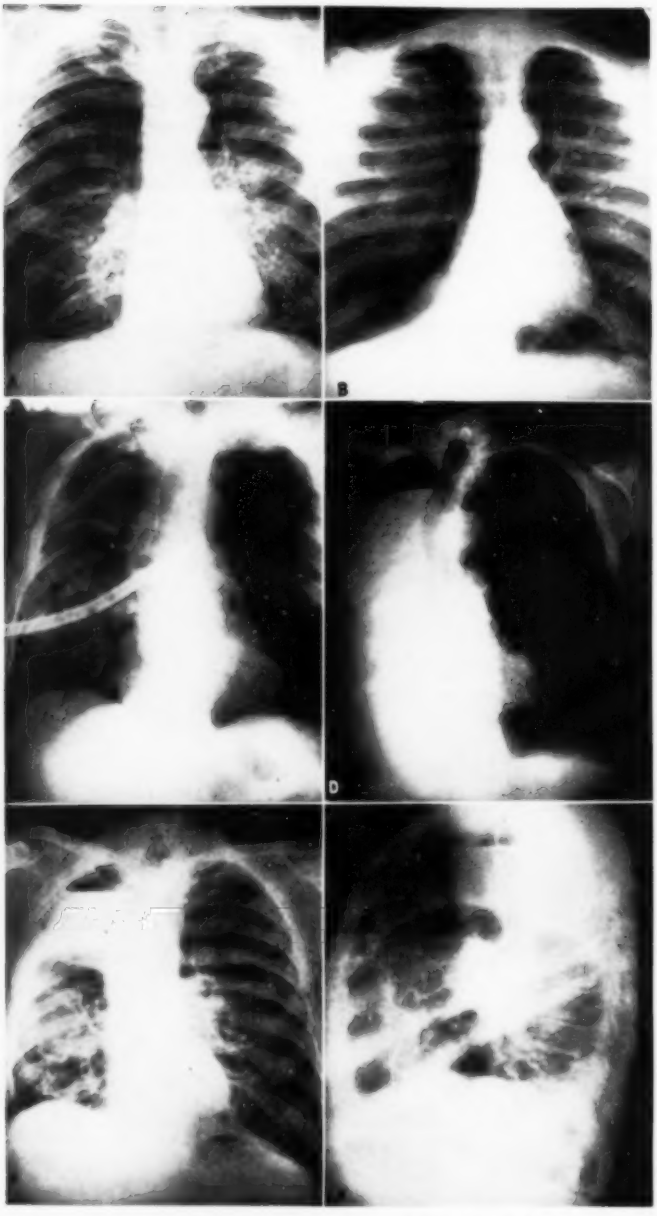

FIGURE 3 (Case 3, J.M.): 60 year old male with right spontaneous pneumothorax following rupture bullous, treated by excision of cyst and creation of pleural tent. *A*. (upper left): Bilateral bullous emphysema upper lobes, more on right, prior to the spontaneous right pneumothorax. — *B*. (upper right): Aspiration air, right pneumothorax prevented respiratory distress but failed to allow re-expansion of

breathing have been common. The initiation of a vicious cycle which may be fatal, if not interrupted, often has called for resourceful and heroic measures.

Although physical examination has been satisfactory as an aid in evaluating the need for emergency therapy, it has failed to provide the information necessary for the correct application of elective pulmonary resection. Additional methods of study have improved the diagnosis and warrant routine use. Meticulous serial roentgenographic check of the clinical observations is essential. Tomography has provided important data such as the size, position and pattern of the lobes, fissures, bronchi, and vessels. Since the improvement that can be expected from excisional

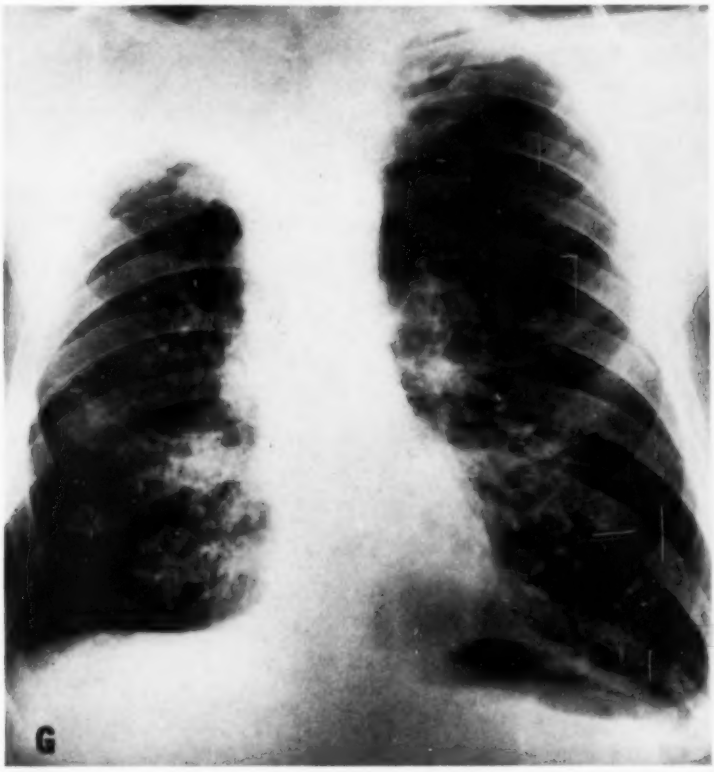

FIGURE 3G: Roentgenogram two years post-operative. Right apical thickening due to organization contents extra-pleural tent space. Lung completely re-expanded and free of bullae.

lung. — *C.* (center left): Immediate post-operative film showing pleural tent (arrow) with extra-pleural pneumothorax above. Tube right pleural cavity is for continuous suction.—*D.* (center right): Later, fluid in extra-pleural space obscures right lung.—*E. and F* (lower): Five days post-operative, frontal and lateral views; aspiration in space above pleural tent permits regulation of expansion of lung.

surgery depends upon the extent of irreversibly damaged lung that can be resected and the volume of compressed lung in which function can be restored by re-expansion, it is important to determine the distribution of the anatomic changes. For this angiocardiography has been a reliable method.[2,3] Multiple exposure studies of the pulmonary circulation reveals that actual and potential functional capacity may be accurately measured by the degree of vascular filling. In cystic over-distended areas the visualization of the pulmonary arterial tree is reduced proportional to the severity of the distention in the cystic areas. In moderately advanced emphysema, the vessels are reduced in both size and number and in far advanced cases, they may be totally absent (Figure 1). The vessels in compressed lung are crowded together and fill poorly. The extent of the over-distended and the compressed areas of lung can easily be appreciated by comparing the segmental arterial pattern with the normal. The proof that this reduction in the number and size of the peripheral vessel branches is temporary, when due to compression, has been substantiated by many post-operative observations. After resection of an emphysematous portion and expansion of the residual lung a prompt reversal toward the normal vascular pattern with improved filling and distribution of the vessels has occurred (Figure 6). The data from bronchography has paralleled that of angiocardiography. In grossly overdistended lung only the primary bronchi have filled. In compressed lung the bronchi are crowded together and fill poorly (Figure 5). After resection of distended areas and re-expansion of the compressed segments the configuration and filling of the remaining bronchi have reverted toward a normal pattern. It also seems evident that the reduction in ventilation in the compressed but still perfused lung plays an important role in this disease and contributes to the severity of symp-

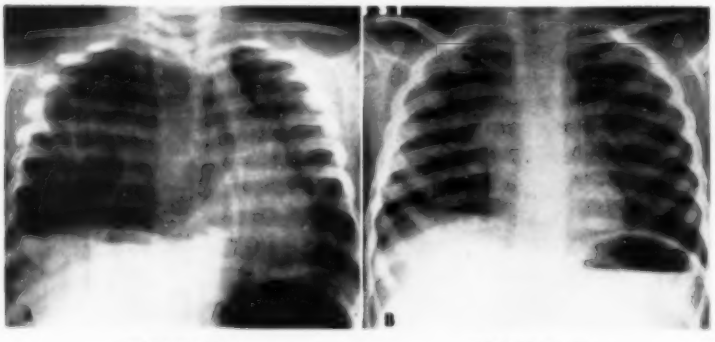

FIGURE 4A FIGURE 4B

Figure 4 (Case 4, B.J.): 11 months old child admitted in extremitas due to ruptured bullae causing respiratory distress, cyanosis and empyema. Emergency intercostal drainage and suction reduced hemolytic staphylococcus pyopneumothorax. Two days later, right upper and middle lobectomy (sites of ruptured and multiple bullae) and decortication right lower lobe was followed by uneventful recovery.—*A*. Pyo-pneumothorax due to ruptured bullae and multiple middle and upper lobe bullae causing marked mediastinal and cardiac shift to left.—*B*. Seven days post-operative roentgenogram, showing normal appearing re-expanded right lower lobe and return of heart and mediastinum to normal positions.

toms. In addition, the possibility of improving the ventilation and perfusion in such areas forms the basis for surgical therapy.

A note of caution is in order. Since the endobronchial instillation of oil in patients with minimal ventilatory reserve is not without risk, it should *not* be a routine diagnostic procedure. *Because of its greater safety and reliability angiocardiography is preferable.*

Other diagnostic procedures have been less helpful. Thoracoscopy has failed frequently to clarify abnormal anatomic details. Simple spirometry has been of limited value since it only indicates the actual, rather than the potential function of compressed lung. However, spirometry and the more elaborate pulmonary and cardiac function studies provide the most accurate measures of assessing the benefits of surgery.

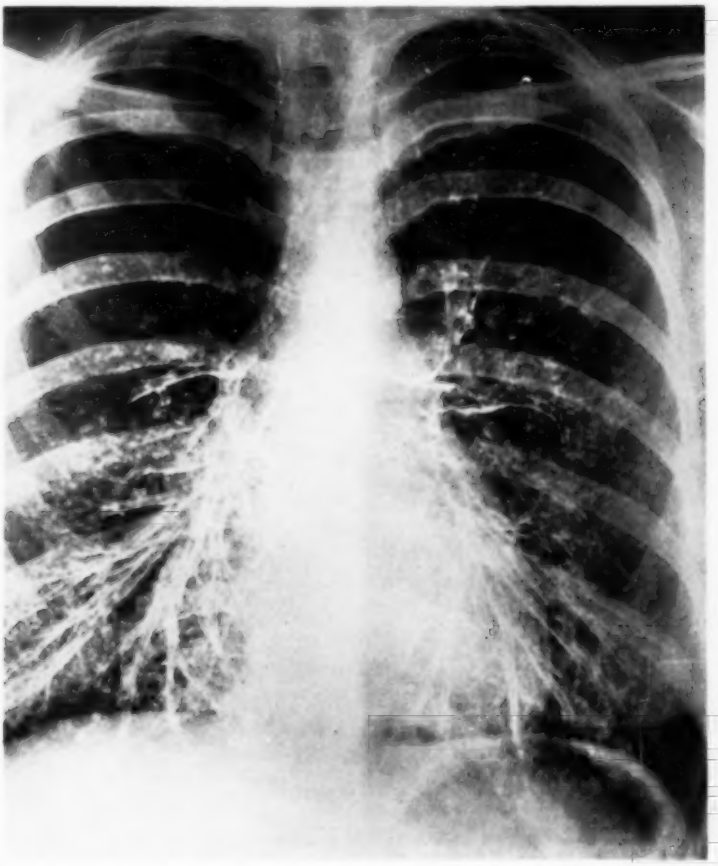

FIGURE 5 (Case 5): *Frontal bronchogram*, of a 23 year old woman with bullous emphysema right upper lobe. Right upper lobe bronchi filled at origin while branches are absent. Note displacement of right upper lobe bronchus downward and crowding of right middle and lower lobe bronchi due to compression by bullous.

Treatment

The indications for emergency surgery have been well documented.[4-9] The role of elective procedures has been neglected. These measures should be used when the volume of destroyed lung is sufficiently localized to permit clean excision and when expansion of the remaining compressed lung tissue can be expected to result in improved pulmonary function. The post-operative results in a large series of cases have demonstrated that such a course can be anticipated regularly by careful evaluation of function in a relatively quiescent period. A complete absence of symptoms may be fortuitous and does not constitute an absolute contraindication to surgery since such security may be temporary in view of the ever present danger of rupture or infection. The most reliable indication for surgery has been evidence, sometimes only intermittently present, of significantly diminished pulmonary function and a lesion which conforms to the previous criteria. Although the emphysematous changes in the remaining lung may conceivably progress, the duration of significant relief (up to five years in some cases) has indicated that surgery is a valuable method of rehabilitation.

Pre-operative preparation deserves special attention. Chronic illness often depletes bodily reserves to such an extent that restoration to a level compatible with surgical treatment is difficult. The anti-biotic agents have helped to control infections. Combining them with a broncho-dilating agent such as vaponephrin and lysing agents like SK, SD, and trypsin has

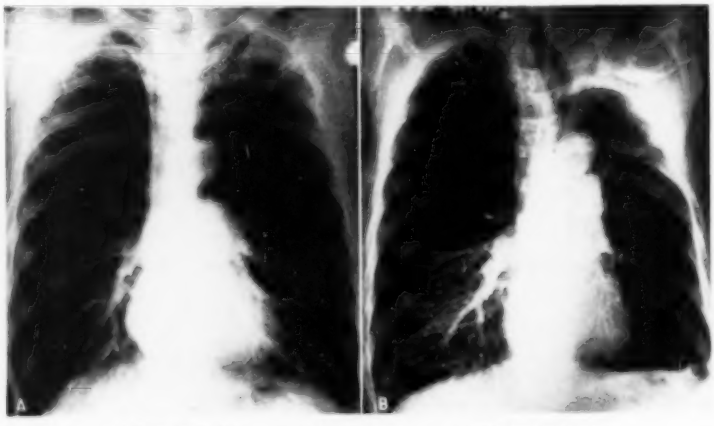

FIGURE 6A FIGURE 6B

Figure 6 (Case 6, G.F.): 56 year old male totally disabled by bilateral bullous emphysema. Left upper lobectomy caused marked improvement and allowed return to work.—*A. Angiocardiogram* prior to surgery reveals absence pulmonary circulation upper lobes at sites giant bullae. Basilar pulmonary circulation markedly compressed.—*B. Angiocardiogram* nine months post-operative. Re-expansion left lower lobe allowed return of pulmonary circulation. Note presence of left basilar cyst does not cause interference with pulmonary circulation. Tent left apex prevents further over-distention of lung. Circulation right lung unchanged. Patient still working three years post-operatively. If necessary right upper lobectomy can be done.

greatly reduced the difficulties of maintaining adequate airways. Postural drainage has not been well tolerated. Fluids, including blood, have been administered with cautious regard for the constant threat of inducing pulmonary edema or heart failure by exceeding circulatory tolerance. Endotracheal administration of general anaesthetics with high concentration of oxygen has given the greatest assurance of adequate and properly controlled anesthesia and respiration. A difficult induction may aggravate the lung distention and further embarrass respiration and should be avoided. When pre-anesthetic medication with drugs such as pentobarbital, morphine or demerol, scopolamine or atropine, topical cocaine and curare has been adequate, fear is allayed and secretions, cough and laryngospasm are depressed. The induction of anesthesia is then followed by a smooth course for the duration of operation. Frequent tracheal suction and occasional bronchoscopy has also been useful.

To minimize annoying recurrent fluctuation of intra-pleural pressure, thoracic decompression frequently has been employed pending opening of the chest for definitive surgery (Figure 4). A variety of surgical procedures has been used. Simple uncomplicated pneumothorax rarely has required more than intermittent aspiration. This also has been satisfactory for the temporary control of many recurrent, tension or non-expanding cases. However, in most of these, closed drainage with carefully regulated suction has been usually necessary because of the ease and promptness of interpleural stabilization, its safety and the uniformly improved results. Local excision of ruptured cystic areas usually was followed by a minimal pleuritic reaction and proved more successful than methods which depends upon chemical or mechanical induction of extensive obliterative and adhesive pleuritis (Figures 2, 3, 4).

Excision, particularly when combined with selective decortication and expansion of compressed and trapped lung, has appeared to promote maximal preservation of pulmonary function. Experience has shown that the diagnosis of extensive pneumothorax without severe symptoms should be viewed with suspicion for tension cysts large enough to fill the hemithorax often have been mistaken for the former (Figure 2). The surprising manner in which extensive cysts have been well tolerated often has been an early clue to the proper situation. Furthermore, such compensated patients must not be brought to the brink of disaster by the creation of a tension pneumothorax due to rupture of the cyst by the illadvised use of an aspiration needle. One of our patients almost expired after rupture of a cyst by needle puncture and it was learned that he had had five previous pneumothoraces induced by aspiration of the cyst. Following this experience exploratory thoracotomy seemed the more logical procedure.

Solitary cysts have been easily isolated and cleanly excised after blunt dissection external to the sac down to the bronchial origin (Figure 2). Since the disease process usually has traversed anatomical planes, block resection has been utilized more than strictly segmental resection. When most of a lobe has been destroyed, lobectomy has been preferred since the difficulties of post-operative expansion and pneumothorax have not

justified the risk of segmental procedures. Strangulation of residual segments has been avoided by suturing these together. Very distended cysts which filled the operative incision required deflation before excision could be completed. After removal of lung all bronchial communications or large air leaks have been carefully closed with fine interrupted silk sutures or ligatures. Major bronchial stumps have been pleuralized. Pulmonary defects have been closed only when this did not compromise re-expansion. Multiple tube drainage with considerable negative pressure suction has promoted early and complete expansion in a situation where it has been impossible to avoid free alveolar leakage of air. Pleural suction tubes often have been retained for seven to 10 days to permit complete and firm obliteration of the pleural space. After resection, a tendency to over-expansion of the remaining lung has been considered an indication to reduce the thoracic volume. This not only may prevent or delay future progress of the emphysema but by hastening obliteration of the pleural space, reduced complications. The pleural tent by creating an extra-pleural hydropneumothorax has been preferred to thoracoplasty. A tent of pleura can be fashioned from the mobilized and trimmed apical parietal pleura and can be sutured to the lower border of the operative incision. Several features of this technic have been found desirable. A tent can be made at the time of resection with practically no added trauma. Its size can be tailored to conform to the desired expansion of residual lung. The rate and degree of such post-operative expansion of the lung can be altered at will by aspirating the contents of the extra-pleural space (Figures 3 and 6). The intact chest wall is more effective in preventing atelectasis, maintaining ventilation and promoting expansion than the flaccid wall after thoracoplasty. The lack of scoliosis also reduces late interference with ventilation in marginal cases. The cosmetic aspect appeals especially to women. All unnecessary injury or sacrifice of the thoracic wall should be avoided in order to minimize respiratory distress in patients with marginal pulmonary reserve. Few bilateral operations have been necessary for the improvement following unilateral procedures produce sufficient functional improvement (Figure 6). Experience indicates that except for the rare emergency, bilateral cases should be treated in stages at prolonged intervals to permit maximum recovery and benefit from each stage. Thoracic exercises, stimulation of cough, control of secretions and alleviation of pain by neurotomy or nerve block have also contributed to rapid recovery and maximal respiratory rehabilitation.

CONCLUSIONS

1) Diminished pulmonary function and distressing symptoms due to pulmonary cysts, blebs and localized emphysema may in selected cases be relieved by surgical resection of the involved pulmonary tissue.

2) Resection is especially indicated when expansion of the compressed and potentially functioning remaining lung tissue can be secured.

3) Angiocardiography has provided accurate pre-operative evaluation of the problem.

4) Cases illustrating the details of diagnosis and pre- and post-operative treatment of bullous emphysema have been presented.

CONCLUSIONES

1) En casos escogidos la disminución de la función pulmonar y otros síntomas debidos a quistes pulmonares, ampollas y enfisema localizado, pueden aliviarse mediante la resección quirúrgica del tejido pulmonar afectado.

2) La resección está especialmente indicada, cuando la expansión del pulmón restante que funcionalmente es susceptible de utilizarse, es posible.

3) La angiocardiografía, ha proporcionado un medio de estimación exacto para este problema.

4) Se han presentado casos que ilustran con detalle el diagnóstico preoperatorio y el tratamiento postoperatorio del enfisema de ampollas.

RESUME

1) La diminution de la fonction pulmonaire et les manifestations symptomatologiques dues aux kystes pulmonaires, aux bulles ou à l'emphysème localisé, peuvent être dans certains cas, améliorées par la résection chirurgicale du tissu pulmonaire atteint.

2) La résection est particulièrement indiquée lorsqu'on peut assurer la réexpansion du tissu pulmonaire resté fonctionnellement actif—que se trouve comprimé par la lésion.

3) L'angiocardiographie est une aide importante pour décider de cette intervention.

4) Les auteurs présentent des cas qui illustrent les corocteustiques anatomique, le diagnostic et le traitement pré et post-opératoire de l'emphysème bulleux.

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"Primary" Undifferentiated Carcinoma in the Mediastinum*

Report of Two Cases with Angiocardiographic and Pathologic Findings

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"Primary" undifferentiated carcinoma in the mediastinum is an uncommon malignant disease. Its origin is in dispute. The diagnosis can only be made by thorough morphological examination to demonstrate its primary site in the mediastinum and its undifferentiated epithelial nature. Isolated references to primary carcinoma of the mediastinum can be found in the literature.[1-6] Sabiston and Scott[2] in a thorough review of mediastinal tumors recorded 10 instances of primary carcinoma in 101 cases.

Two cases with complete autopsies are herein reported and their clinical and radiological findings are correlated and evaluated. The purpose of this paper is to call attention to the bizarre and fulminating character of this condition.

Case 1: A 59 year old white man (N.Y.H., No. 590065) was admitted on January 14, 1951. He had been well until one month before admsision when he developed sudden sharp pain in the left shoulder. Coughing, severe dyspnea, night sweats and weakness followed. On admission he was found to have fever, tachycardia, tachypnea and his blood pressure was 150/100. Pertinent physical findings were venous engorgement associated with fullness of the left neck and left arm. Tubular breathing, increased vocal and decreased tactile fremitus were present over the left chest, the trachea was deviated to the right and the liver was enlarged. Laboratory findings were within normal limits except for a white blood cell count of 15,500. Bronchoscopy revealed extrinsic pressure on the trachea. Venous pressure was 115 mm. H_2O in the right arm and 245 mm. H_2O in the left.

On entry, the chest roentgenogram (Figure 1A) revealed massive left pleural effusion with mediastinal shift to the right. Following thoracentesis, with removal of 1,000 cc. serosanguinous fluid, marked respiratory relief occurred and the chest films (Figures 1B and 1C) revealed a large mediastinal mass. Angiocardiography made by injecting the right arm (Figures 1D, E, F, G) revealed downward displacement of the left pulmonary artery and its branches. Papanicolaou studies of the sputum and pleural fluid showed no evidence of tumor cells.

At operation, a necrotic, non-resectable tumor involving the pleura and left lung was found. Biopsies were taken which were subsequently reported to be carcinoma. X-ray therapy was instituted on February 6, 1951 and a calculated tumor dose of 1,800r was delivered in 11 days. Therapy was discontinued when the patient became weaker, more dyspneic and had recurrence of massive left pleural effusion. He died on February 21, 1951, 38 days after admission and 68 days after onset of symptoms.

Autopsy (No. 14066) was complete except for examination of brain and spinal cord. The superior mediastinum was filled with a large tumor, about 15 cm. in diameter (Figure 2A). The right border was rounded and smooth but on the left,

*From the Department of Radiology of the New York Hospital—Cornell Medical Center. Aided by a grant from the Mallinckrodt Chemical Works.

the tumor invaded the thoracic cage and left lung. The mass was friable, hemorrhagic and partly necrotic. Metastatic foci were noted in the liver, kidneys, intestine and right lung. The left subclavian and jugular veins were completely occluded by adherent thrombi. Other findings included pericardial effusion, fibrous adhesions and hemorrhagic pleural fluid on the left. The thymus could not be identified.

Microscopic examination revealed sheets of an undifferentiated carcinoma at the periphery of a necrotic mass. The tumor cells appeared large with pale cytoplasm and large vesicular type chromatic nuclei of various sizes. Tumor giant cells and cells with giant multilobulated nuclei were common (Figure 2B). There was no evidence of teratomatous or neurogenic tissue. The microscopic diagnosis was "primary" carcinoma of the mediastinum.

Case 2: A 27 year old white man (N.Y.H. No. 620336) referred by Dr. Maxwell L. Gelfand was admitted on January 26, 1952. He had been entirely well until one month before admission when he suffered "blinding" pain over the left eye. This lasted an hour and was followed by generalized aches and pains. He became weak, dyspneic and easily fatigued and developed fever, night sweats and palpitation. A chest roentgenogram (Figure 3A) revealed a large mediastinal tumor. On admission he was found to have fever, tachycardia, tachypnea and the blood pressure was 140/89. Physical examination revealed a loud blowing systolic murmur over the pulmonic area. The chest x-ray film (Figure 3B) demonstrated an enlarged and lobulated mediastinal tumor. Laboratory examinations were normal. Angiocardiography (Figure 4) revealed a polypoid deformity of the superior vena cava, displacement and deformity of the main stem pulmonary artery and branches and tumor adjacent to the left ventricle and aorta. Because of these changes operation was not advised.

X-ray therapy was instituted on January 29, 1952 and a calculated tumor dose of 1,900r was delivered in 17 days. He continued febrile and developed left pleural effusion. He left the hospital and was subsequently admitted to another hospital where surgery was performed on February 27, 1952. A large fluctuant tumor was found in the anterior and posterior mediastinum between the left pulmonary artery and the aortic arch. The mass was necrotic and could only be partially removed. Firm neoplastic tissue remained adherent to the pericardium, pulmonary artery, aorta, left innominate vein and superior vena cava. Biopsy revealed a highly undifferentiated anaplastic carcinoma.

He died on April 4, 1952, 68 days after his first admission to the hospital and 98 days after the onset of symptoms. Autopsy revealed an undifferentiated carcinoma of the anterior mediastinum with extension to the superior vena cava, heart and lungs. The final gross and microscopic diagnosis was "primary" carcinoma of the mediastinum.

Discussion

Carcinoma of the mediastinum may originate in the esophagus, tracheobronchial tree, thymus, aberrent thyroid or parathyroid tissues, teratoid tumor or from a distant primary cancer. A complete autopsy usually determines the site of origin of such a growth. Thymic carcinomas, particularly those containing Hassall's corpuscles and malignant teratomas with their several different types of tissue may be readily recognized. On the other hand, the origin of undifferentiated mediastinal carcinoma is not known. They are thought to be of thymic or teratoid origin. Most authorities believe that the thymus is the most frequent source of cancers in this region.[1,3] Decker's[7] observation that only 30 per cent of thymic malignancies contain the diagnostic Hassell's corpuscles fits in with the thymic

origin of such mediastinal cancer. Another possibility is malignant degeneration of an embryonic rest.[2,8]

"Primary" undifferentiated carcinoma of the mediastinum is a fulminating disease of sudden onset which so far has not been amenable to surgical or radiation therapy. Most of the cases occur in men between the ages of 30 and 60 years. Dyspnea and chest pain are the most common complaints accompanied by cough, fever, and weakness. Mediastinal compression causing superior vena caval syndrome is a frequent complication while weight loss and hemoptysis are late findings.

Angiocardiography by demonstrating the involvement of the cardiovascular structures plays an important role in predicting non-resectability of cancer.[9-12] In case 1, injection of the right arm precluded discovery of the left brachiocephalic venous thrombosis. The widespread deformity of the left pulmonary artery without any evidence of occlusion or invasion failed to disclose the truly malignant nature of the growth (Figure 3). However,

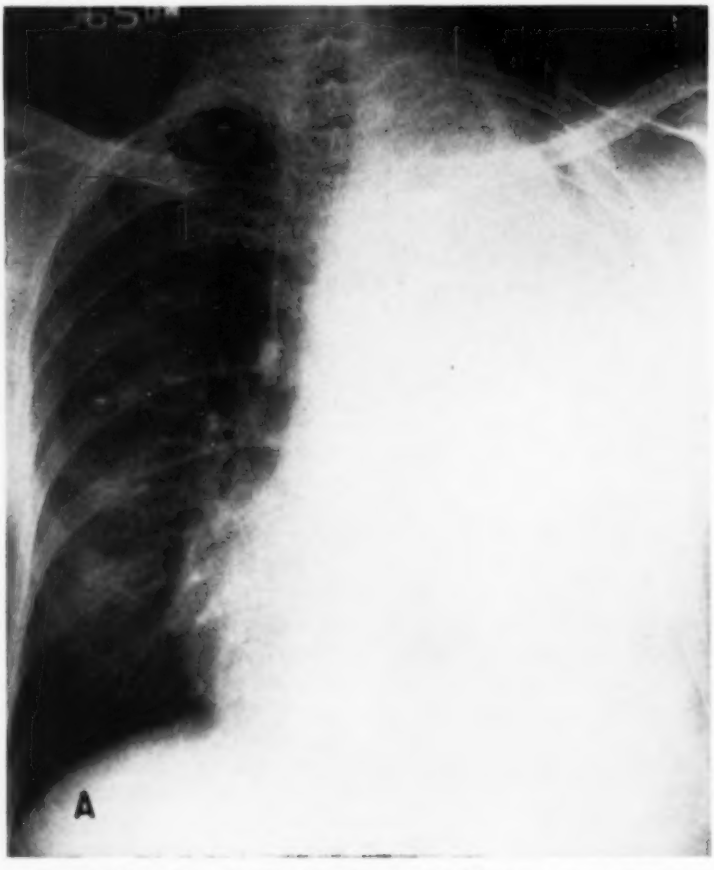

FIGURE 1A (Case 1): Massive left pleural effusion obscuring lung.

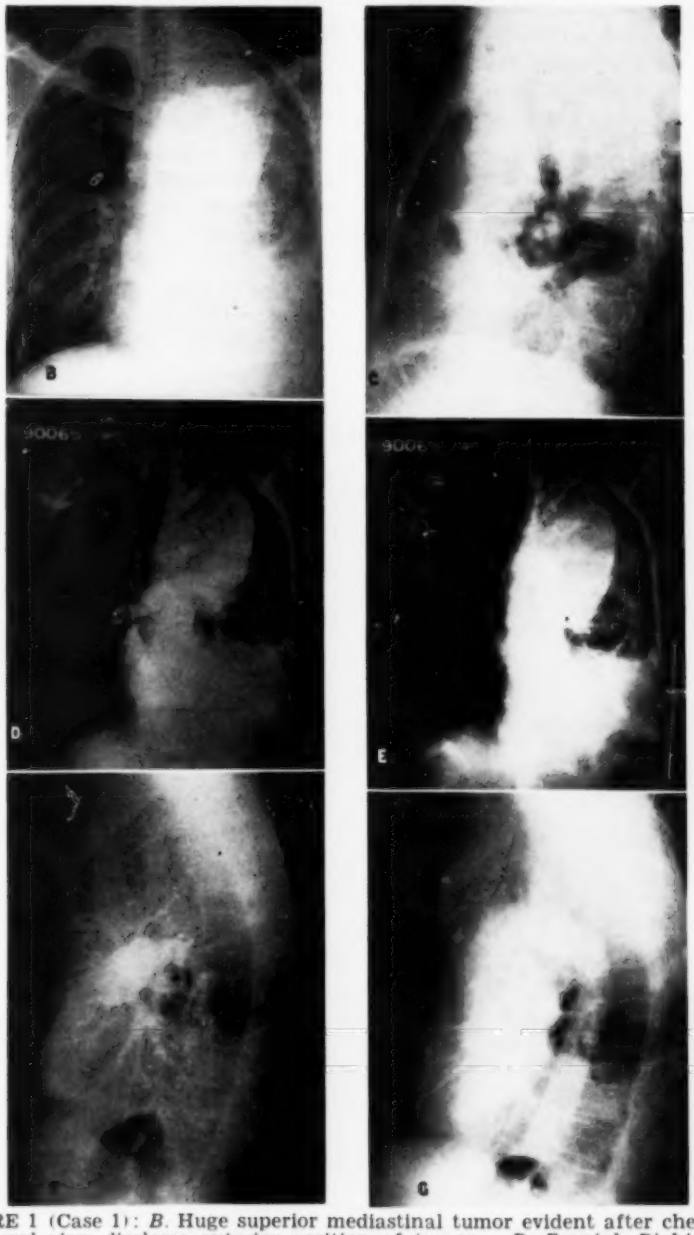

FIGURE 1 (Case 1): *B*. Huge superior mediastinal tumor evident after chest tap. *C*. Lateral view discloses anterior position of tumor.—*D*. *Frontal, Right Heart Angiocardiogram*, after right arm injection reveals marked downward displacement and crowding of left pulmonary artery. Lower portion of left lung obscured by fluid.—*E*. Left ventricle, aorta and brachiocephalic vessels visualized.—*F*. *Lateral, Right Heart Angiocardiogram*. Note the downward displacement of left pulmonary artery with poor vasculature of left upper lobe.—*G*. *Lateral, Left Heart Angiocardiogram*. The transverse aorta is displaced downward.

case 2 showed serious vascular invasion and distortion. The superior vena cava had a polypoid deformity and the pulmonary conus, artery and left branch (Figure 4) were markedly deformed. These findings accurately predicted the difficulties encountered on surgical exploration.

Both our cases received high voltage x-ray treatment. A satisfactory tumor dose was never attained because of the rapid progress of the disease. Although early surgical intervention seems the only possible hope for these patients, none have proved resectable because of the widespread involvement of the mediastinal structures. Newer radiotherapeutic modalities such as rotation and high voltage therapy have greater palliative promise and may allow adequate tumor dosage after surgical biopsy has suggested the diagnosis.

The two cases reported are illustrative of the rapid fulminating course and widespread involvement of the mediastinal structures by "primary" carcinoma of the mediastinum. Although biopsies indicated the tumor to

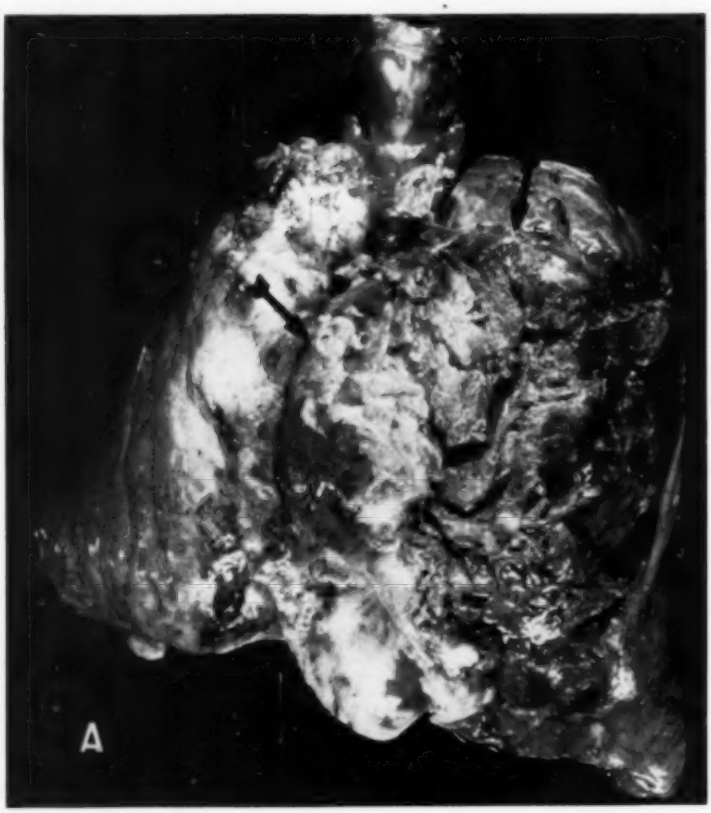

FIGURE 2A (Case 1): Gross and microscopic autopsy specimen of mediastinal carcinoma. Arrows bracket the huge necrotic invasive cancer.

be a carcinoma in the anterior mediastinum, the differentiation between metastatic carcinoma, thymic carcinoma, terato-carcinoma and primary carcinoma of the mediastinum could not be made until a complete autopsy had been performed.

Acknowledgement: Thanks are due to Dr. George H. Humphreys II for making the operative and pathologic findings available in case 2.

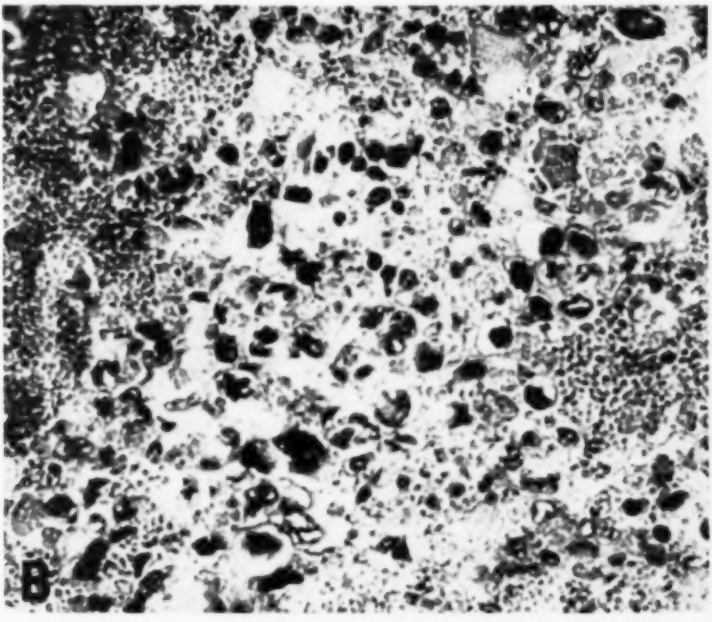

FIG. 2B (Case 1): Gross and microscopic autopsy specimen of mediastinal carcinoma. Microscopic section (X400) showing anaplastic carcinoma cells with mitosis.

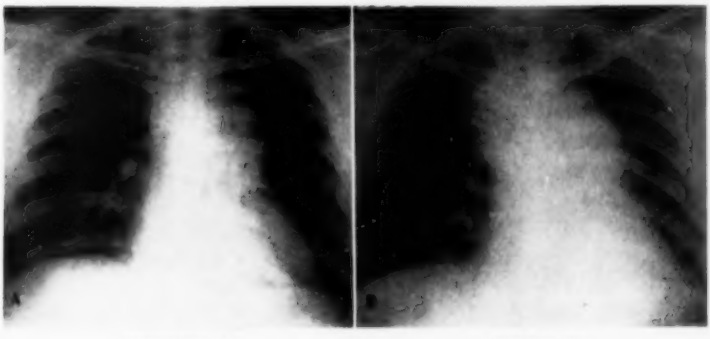

FIGURE 3A FIGURE 3B

Figure 3 (Case 2): *A*. Huge left superior mediastinal carcinoma. *B*. Rapid growth and lobulated appearance of tumor after three weeks.

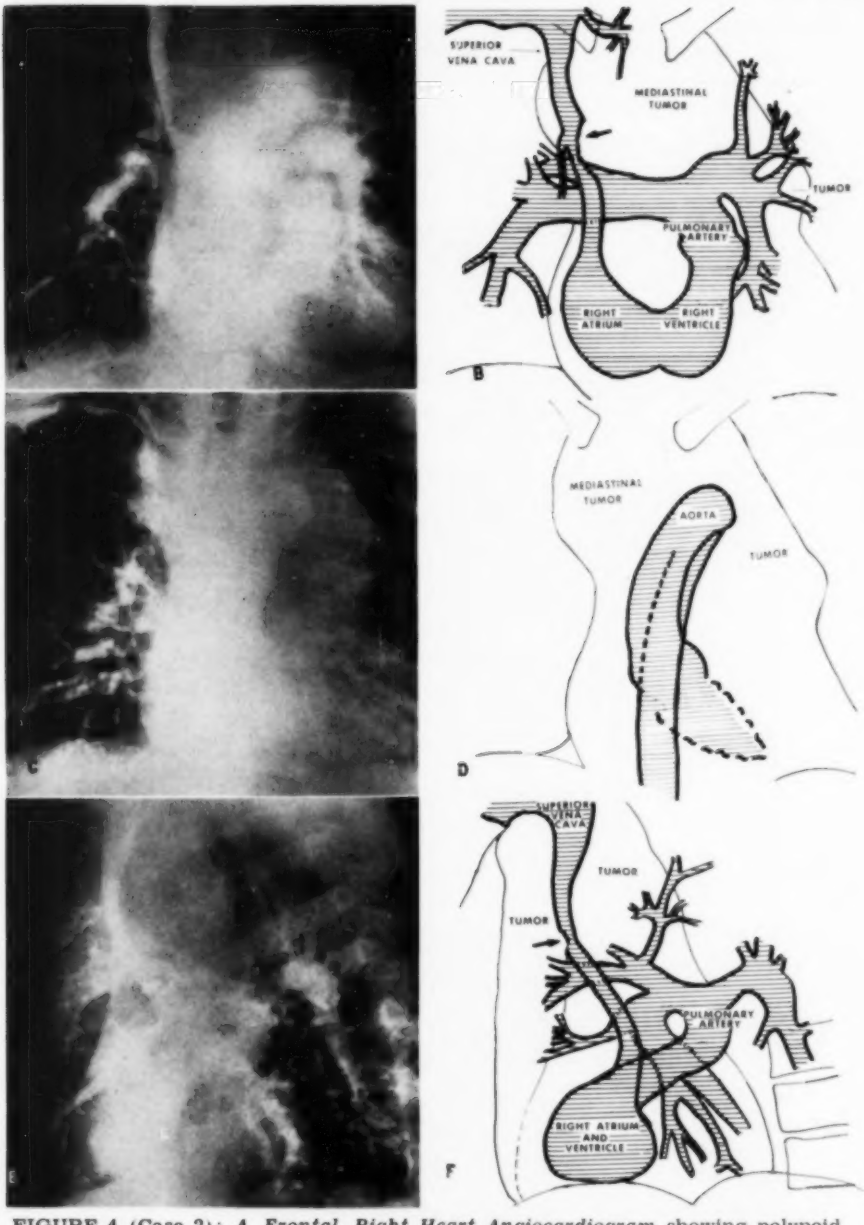

FIGURE 4 (Case 2): ***A. Frontal, Right Heart Angiocardiogram*** showing polypoid defect of superior vena cava (arrow) and deformity of the left pulmonary artery. ***B. Tracing of A.—C. Frontal, Left Heart Angiocardiogram*** revealing tumor adjacent to aorta and left ventricle.—***D. Tracing of C.—E. Lateral, Right Heart Angiocardiogram*** again showing invasion of superior vena cava (arrow) and marked deformity of pulmonary conus, artery and branches.—***F. Tracing of E.***

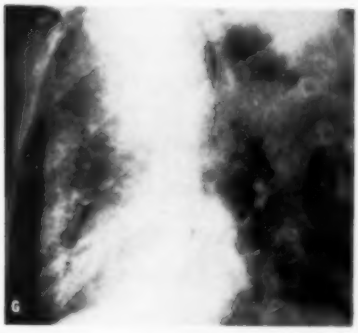

FIGURE 4G

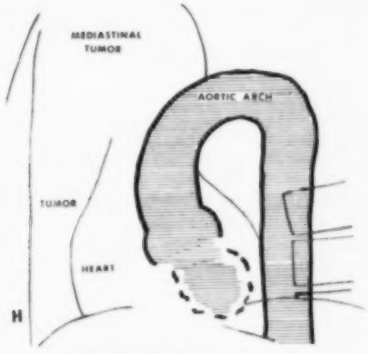

FIGURE 4H

Figure 4 (Case 2): *G. Lateral, Left Heart Angiocardiogram.* The ascending aorta and heart are surrounded by tumor.—*H. Tracing of G.*

SUMMARY

Two cases of "primary" undifferentiated carcinoma in the mediastinum are reported. The diagnosis could only be established after complete autopsy. Attention is called to the rapid fulminating course which was not altered by surgery or radiation therapy. Roentgenography demonstrated the fulminating character of the lesion while angiocardiography in one instance predicted the malignant invasion of the cardiovascular structures by the tumor.

RESUMEN

Se relatan dos casos de carcinoma "primario" indiferenciado en el mediastino. El diagnóstico pudo establecerse sólo después de una autopsia completa. Se llama la atención sobre el hecho de que la evolución rápida, fulminante, no fué alterada por la cirugía ni por la radiación. La roentgenografía, demostró el carácter fulminante de las lesiones, en tanto que la angiocardiografía en un caso indicó la invasión maligna de los órganos cardiovasculares.

RESUME

Les auteurs rapportent deux cas de cancers primitifs indifférenciés du médiastin. Le diagnostic n'a pu être affirmé qu'après l'autopsie. Ils attirent l'attention sur l'évolution véritablement fulgurante qui n'a pu être enrayée ni par la chirurgie, ni par la radiothérapie. La radiographie a montré le caractère suraigu de la lésion et l'angiocardiographie, dans un cas, permit de préveir l'envahissement des éléments cardio-vasculaires par la tumeur maligne.

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Myxoma of the Heart
Roentgen Diagnosis During Life in Three Cases*

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Heretofore, the presence of myxoma of the heart could only be suspected during life. Angiocardiography in three cases, one early in life; one in the fifth; and the other in the sixth decade revealed characteristic left atrial filling defects. Subsequent surgical exploration with removal of fragments of the tumor in two instances confirmed the diagnosis of myxoma. Two patients failed to survive operation and autopsy examination established the validity of the angiocardiographic findings. The fact that cardiac myxomas are benign lesions often attached to the interatrial septum by a stalk makes their surgical removal a practical possibility. Furthermore, advances in surgical techniques such as the atrial well[1] and the development of extracorporeal mechanical pumps[2] are expected to make surgery curative.

Case Reports

Case 1: A 53 year old white woman (N.Y.H. No. 576014) was referred from another hospital on August 15, 1950 for angiocardiography because of the finding of a right hilar mass. Five months earlier, she had had a sudden onset of crushing left chest pain radiating to the back and associated with weakness, palpitation and dyspnea. She remained in the hospital for two months with little improvement. Serial electrocardiograms showed normal sinus rhythm and a normal electrocardiographic pattern. Two months later, she was readmitted because of recurrence of sudden crushing substernal pain. No heart murmurs or electrocardiographic abnormality were detected but a right hilar mass was seen in the chest roentgenogram.

Her symptoms began at the age of 26 years with aching in neck and calf muscles. Joint pains, tonsillitis and chorea were denied. The next year, dyspnea, generalized weakness and palpitation on exertion began. The dyspnea gradually increased until six years ago when she could only climb two stairs. Constricting precordial pain radiating to both sides of the neck started five years ago and became associated with palpitation and marked weakness. Rest, particularly when lying on the right side relieved the chest pain but not the palpitation. She was in a German concentration camp for four years during World War II and managed to get to the United States in 1949. The effects of her war experiences left her markedly depressed.

On admission she was well developed and nourished although depressed. The heart rate was 90 with normal sinus rhythm and the blood pressure was 120/80. There were no cardiac murmurs and the electrocardiogram showed only left axis deviation. Chest x-ray film (Figure 1) revealed generalized heart enlargement, prominence of the pulmonary artery segment and left atrial enlargement. Angio-

*From the Departments of Radiology and Surgery, the New York Hospital—Cornell Medical Center. Aided by a grant from the Mallinckrodt Chemical Works.

cardiography (Figure 2) showed a constant filling defect in the left atrium. This was considered evidence of an interatrial tumor. She was not improved after a month's stay in the hospital.

Weakness, palpitation and dyspnea continued and became worse. On a visit to the clinic, October 26, 1951, she was discovered to have a totally irregular pulse with a rate of 140 to 150 per minute. Electrocardiography revealed rapid auricular fibrillation with impure flutter. Digitoxin was prescribed and after a night's observation she was sent home. After a brief episode of digitalis toxicity, digitalis leaf was substituted and on a daily maintenance dose she has satisfactory slowing of the heart rate. Cardiac catheterization performed with Dr. Daniel S. Lukas on November 2, 1951 revealed pulmonary arterial and pulmonary capillary (wedge) hypertension, and a low cardiac output. After one months hospital stay, although her heart rate was slowed, she was unimproved.

For the next 15 months she was seen regularly in the out-patient department but was found to be getting worse. Finally, on February 12, 1953 she was readmitted for surgical excision of the left atrial tumor. A short, grade two, systolic murmur was heard at the apex. The heart rhythm was irregular, the ventricular rate was 96, and the blood pressure 90/60. She appeared pale, and the hemoglobin was 10 grams. Two transfusions (250 cc. each) of packed red blood cells were given. There was no enlargement of the liver or leg edema. Repeat angiocardiography (Figure 2) on February 13, 1953 showed an increase in size of the left atrium and of the intraatrial mass. On February 19, 1953, surgical exploration verified the presence of a left atrial tumor.

Post-mortem examination (N.Y.H. Autopsy No. 14947) revealed a multilocular, rubbery, dark brown gelatinous left atrial tumor 15 x 7 x 6 cm. in diameter and weighing 150 grams (Figure 3). The tumor cut with ease. The atrial wall was thickened at the origin of the tumor and there was a 3.5 cm. pedicle. Microscopically, the tumor appeared mostly cellular at its origin where there was thickened collagenous endothelial tissue with loose myxomatous tissue, abundant blood supply and mononuclear cells of various sizes and shapes. Clumps of cells with abundant acidophillic cytoplasm in syncytial masses all covered by a single thin layer of endothelium were also seen. The histologic diagnosis was myxoma.

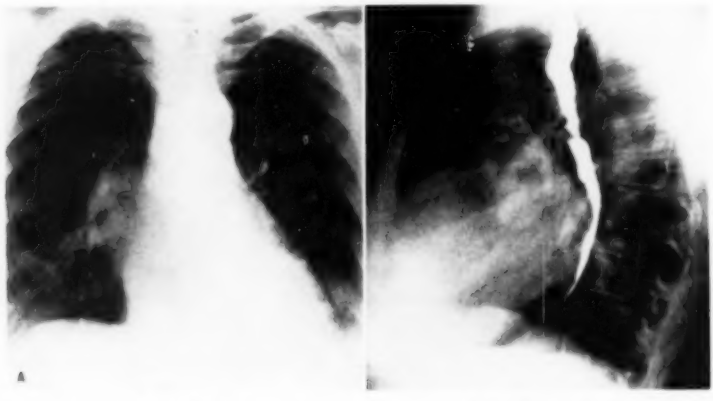

FIGURE 1A FIGURE 1B

Figure 1: Intra-atrial myxoma, Case 1. Conventional chest roentgenograms, 1953. A. Postero-anterior view shows moderate generalized cardiac enlargement with a localized bulge of the right heart border just below the right pulmonary artery. *B.* Lateral esophogram reveals posterior enlargement of the left atrium, as in mitral stenosis.

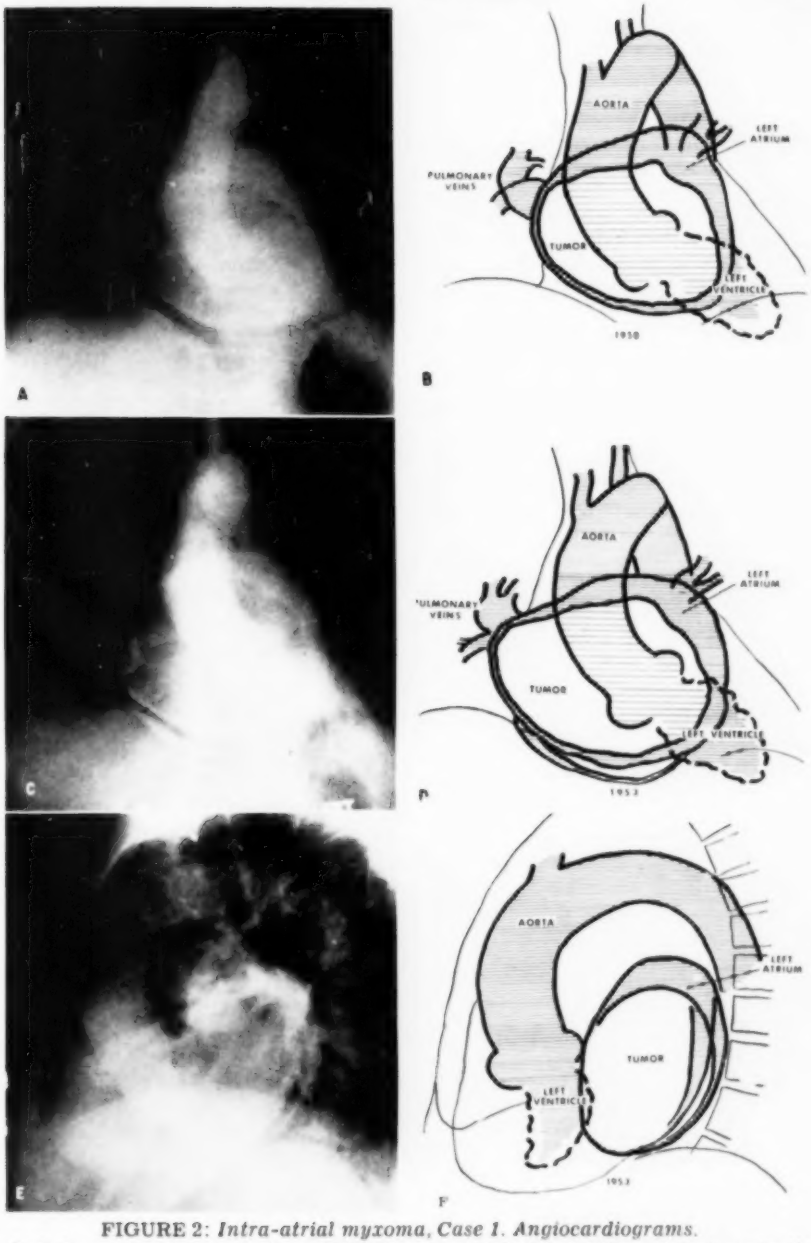

FIGURE 2: *Intra-atrial myxoma, Case 1. Angiocardiograms.*

A. Left heart, frontal projection, 1950. There is a lobulated filling defect centrally located in the enlarged left atrium.—*B*. Tracing of *A*.—*C*. Left heart, frontal projection, 1953. The left atrium and the tumor have increased in size.—*D* .Tracing of *C*.—*E*. Left heart, lateral projection, 1953. Tumor mass virtually fills the entire left atrial cavity in this as well as the frontal projection.—*F*. Tracing of *E*.

The heart weighed 490 grams. The right atrium, right ventricle and left atrium were dilated approximately one and a half times their normal size. The left ventricle wall measured 15 mm. in thickness; the right ventricle 3 mm. The coronary arteries were atheromatous but patent throughout. The cardiac valves were intact and free of vegetations. The aorta was generally atheromatous but no more than that of a normal person of 55 years.

Case 2 (Previously published in *Circulation*, 6:762, 1952): A white male child (N.Y.H. No. 591973) three years of age, was first admitted to the New York Hospital on February 6, 1951. The past history was unremarkable except for measles at two and one-half months and chicken pox at six months. The family history revealed rheumatic fever in the paternal grandmother and a paternal aunt. He had good health until March 17, 1950, when (at the age of two years and three months) he suddenly developed a right sided hemiparesis. The paralysis lasted for only 10 minutes, but weakness remained. He was admitted to another hospital

FIGURE 3: *Gross Pathological Specimen, Case 1.*
The large myxoma is in situ in the enlarged left atrium.

where physical examination of the heart was unremarkable and laboratory studies did not clarify the cause of the hemiparesis. There was no change until the next month when he complained of the sudden onset of pain in his left foot. His mother noted "red spots" along the side of the foot. However, the pain and discoloration subsided in a week and at no time were severe enough to lead to consultation with a physician. A second episode of brief paralysis of the right arm and leg occurred suddenly on September 12, 1950. Residual weakness was more marked this time. A new finding was the presence of an apical systolic murmur. The third occurrence of paralysis of the right arm and leg was noted October 22, 1950, 12 hours following a reported injury to his head. He was hospitalized again and had an uneventful course. Residual weakness was still marked. During the two months of this hospitalization several important cardiac abnormalities were noted. An apical systolic murmur was almost constantly present. An apical presystolic rumbling murmur was heard well at certain times and poorly or not at all at others. Fluoroscopy disclosed an enlarged left atrium and right ventricle.

Physical examination on transfer to the New York Hospital showed a well-developed three year old boy with weakness of the right arm, leg and face. There were increased resistance to passive extension, hyperactive deep tendon reflexes, positive Babinski and finger-stretch reflexes. The heart was not enlarged to percussion. There was an apical presystolic thrill. The first sound at the apex was accentuated and preceded by a rumbling crescendo murmur. The second pulmonic sound was not accentuated. The blood pressure was 110/70. There was no venous distention and the peripheral pulses were normal. The remainder of the examination was unremarkable. Extensive laboratory studies showed no significant abnormality. Fluoroscopy and x-ray film again showed a large left atrium and right ventricle while the left ventricle and the pulmonary arteries were normal (Fig. 4).

The course in the hospital was unremarkable. Angiocardiography demonstrated a large, irregular, polypoid filling defect in the left atrium anteriorly, immediately above the mitral orifice (Figure 5). The left atrial appendage was uninvolved. These findings were interpreted as indicative of a tumor (probably a myxoma) within the left atrium. Surgical treatment was postponed in view of the great risk involved and with the hope that a satisfactory extracorporeal circulatory mechanism might become available soon.

The child was discharged from the hospital on March 2, 1951. Shortly afterwards there was a transient episode of swelling and redness of the left second toe. A

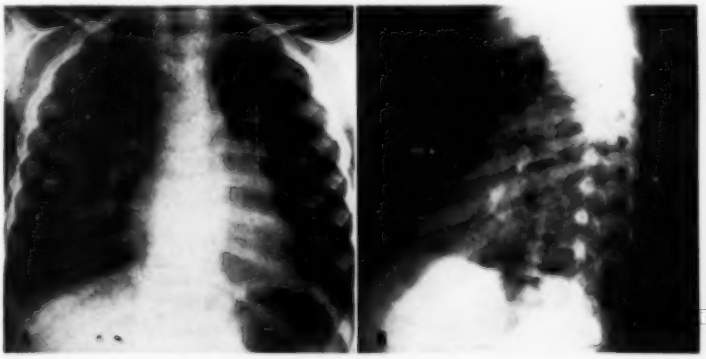

FIGURE 4A FIGURE 4B

Figure 4: Intra-atrial myxoma, Case 2. Conventional chest roentgenograms. A. Frontal.—*B.* Lateral. Films and fluoroscopy demonstrated moderate left atrial enlargement.

short course of x-ray therapy to the heart was given at another hospital during May of 1951 without any change in the cardiac findings. He was treated for bronchitis in April and pneumonia in May. During a visit to the New York Hospital Cardiac Clinic on July 25, 1951, he was noted to be in general good health. There was no change in the cardiac findings but fluoroscopy showed pulsatile dilatation of the pulmonary arteries.

On September 12, 1951, the child developed edema of the face, arms and legs and was admitted to the New York Hospital two days later. He was acutely ill with obvious dyspnea and orthopnea. The cervical veins were distended. A firm and tender liver edge was palpated 8 cm. below the costal margin. The lungs were clear; the respiratory rate was 36. The heart rate was 132 and the blood pressure 108/70. The heart was enlarged to the left. The other cardiac signs were unchanged. Edema was not noted. Venous pressure was 440 mm. saline and the fluoroscein circulation time from arm to lips was 16 seconds. Electrocardiography showed right axis deviation, a notched P_1 and variable widening of P_2. Digitalization and oxygen therapy led to moderate improvement but the liver edge remained 5 cm. below the costal margin and venous pressure only fell to 255 mm. saline. Digitalis dosage was extended to early toxicity and mercuhydrin was given every day for a week. Improvement did not result however and attacks of cyanosis and dyspnea necessitated the use of oxygen therapy. With the realization that surgery offered the patient his only chance for survival this was undertaken on October 11, 1951, 19 months after the onset of symptoms. Excision of the tumor was attempted but was unsuccessful.

Postmortem examination (N.Y.H. Autopsy No. 14349) revealed that the tumor mass, portions of which remained attached to a broad flat pedicle, took origin from the interatrial septum at a point anterior to the foramen ovale (Figure 6). As had been noted at operation, the tumor had a multilobular character and was moderately gelatinous in consistency. Microscopic examination disclosed that the tumor was covered by endocardium and consisted of an evenly stained acidophilic

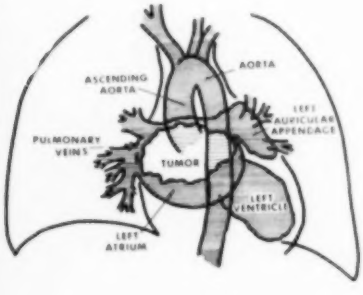

FIGURE 5A FIGURE 5B

Figure 5: Intra-atrial myxoma, Case 2. Angiocardiograms.
Frontal left heart angiocardiogram.

A. The enlarged left atrium and its appendage are well filled as are the left ventricle and aorta. An irregular oval filling defect resulted from displacement of opaque substance within the left atrium. This was constant on all left heart films in frontal and lateral projections.—*B*. Tracing of *A*. (Previously published in "Circulation," 6:762, 1952).

myxomatous stroma. The cells, often multinucleated, were widely spaced and had stellate cytoplasm. There was no evidence of malignancy.

The histologic diagnosis was myxoma. The right ventricle was moderately hypertrophied, its wall measuring 6 mm. in thickness. The edges of the mitral valve and chordae tendineae were thickened, possibly as a result of direct trauma caused

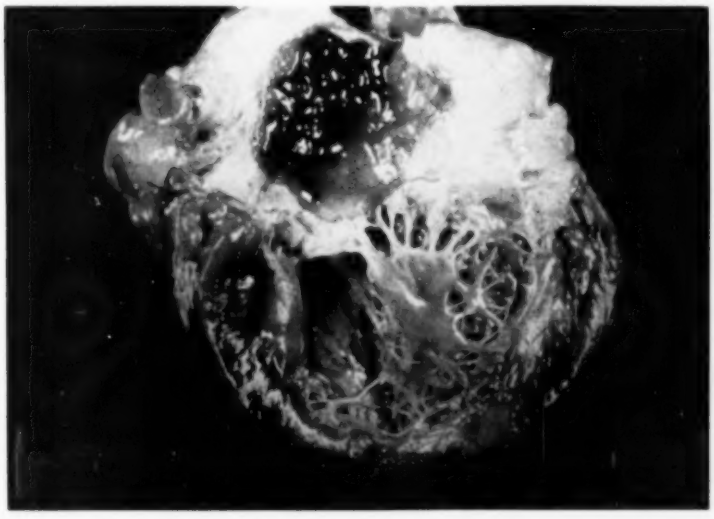

FIGURE 6: *Gross Pathological Specimen, Case 2.* The tumor arises from the anterior portion of the interatrial septum just above the mitral valve orifice. The chordae tendineae of the mitral valve are shortened and thickened. (Previously published in "Circulation," 6:762, 1952).

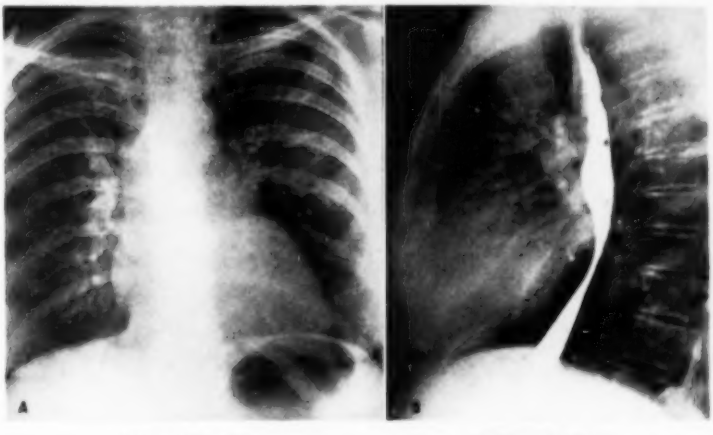

FIGURE 7A FIGURE 7B

Figure 7: Inter-atrial tumor, Case 3. Conventional chest roentgenograms.
A. Frontal view shows slight prominence of pulmonary artery segment.
B. Lateral esophogram reveals indentation of the lower esophagus by an enlarged left atrium.

by the tumor itself. Although it is conceivable that this change in the valve chordae tendineae may have been a result of rheumatic fever, careful study of many sections of the heart revealed no Aschoff bodies. There was evidence of previous embolic infarction in the left cerebral hemisphere and the kidneys.

Case 3: A 46 year old housewife (N.Y.H. No. 657427) was admitted (Service of Dr. Theodore W. Oppel) on May 26, 1953. Three days previously while bending to plant seeds she had sudden onset of discomfort in the chest and palpitation. Cough, dyspnea on exertion and two pillows orthopnea followed. In the past, she had always been well and denied sore throats, chorea, rheumatic fever or heart trouble. She lived on the fourth floor of a walk-up apartment and made the climb with ease and furthermore, she had been fond of mountain climbing.

On examination, she was dyspneic but not cyanotic; the pulse was 130 and

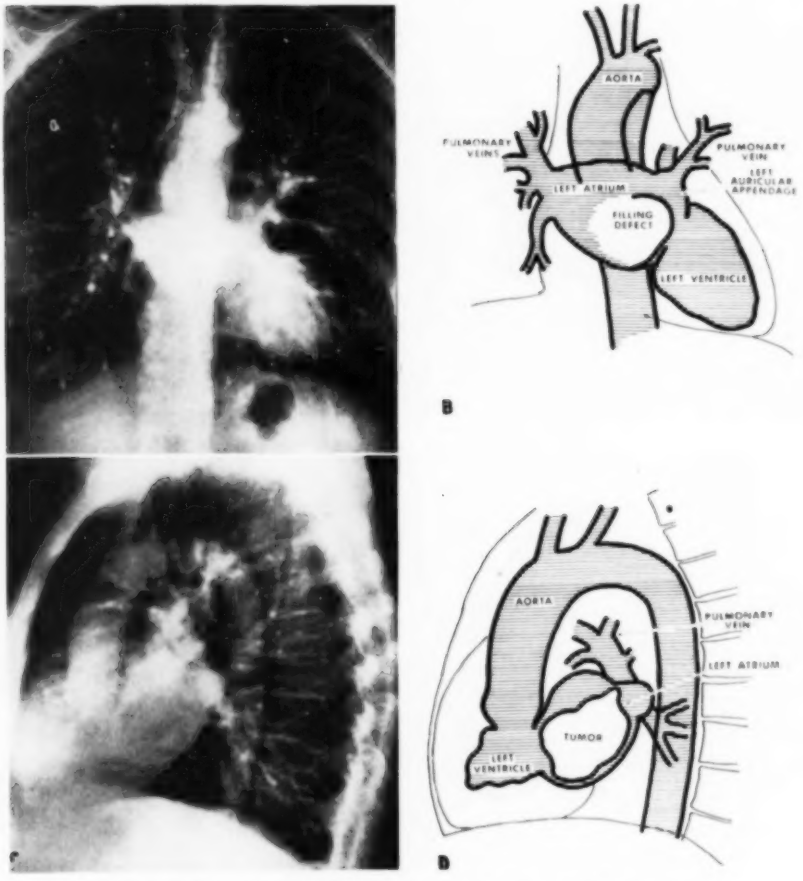

FIGURE 8: *Inter-atrial tumor, Case 3. Angiocardiograms.*

A. Frontal. A constant filling defect *approximately 4 cm.* is seen in the enlarged left atrium.—*B.* Tracing of *A.*—*C. Left lateral.* A left atrial tumor measuring approximately 4 cm. in diameter is seen in the posterior aspect of the left atrium.—*D.* Tracing of *C.*

regular; blood pressure 150/90. Moist rales were present in the posterior lower third of the lungs. Presystolic and systolic apical murmurs were heard. On lying, only a systolic murmur was present. The liver was not enlarged and there was no leg edema. The frontal chest x-ray film (Figure 7A) revealed slight prominence of the pulmonary artery segment while the lateral esophogram (Figure 7B) demonstrated left atrial enlargement. The electrocardiogram showed normal sinus rhythm, deviation of the electrical axis to the left but without predominence of either ventricle.

She became asymptomatic after four days treatment with digitalis, nasal oxygen, mercurials and low salt diet. Because of heart failure in the presence of mitral stenosis, preoperation evaluation for mitral valvulotomy was undertaken. Dr. Daniel S. Lukas found an hemadynamic pattern suggestive of a mitral valve obstruction but it was unlike the cardiac catheterization findings of rheumatic heart disease.[3] Angiocardiography showed a filling defect measuring approximately 4 cm. in diameter in an enlarged left atrium (Figure 8). On June 27, 1953, operation verified the presence of a left atrial tumor. Excision was not attempted because it seemed unlikely that the large tumor could be delivered through the normal sized left atrial appendage, and furthermore, the tumor felt hard and seemed to have a wide attachment along the interatrial septum.[4] A biopsy was believed to be inadvisable.

Discussion

Primary tumors of the heart are uncommon, occurring it is estimated, in 0.05 per cent of all autopsies.[5] Prichard[6] reviewing the subject extensively in 1951, clearly established that myxomas are the most frequent primary cardiac tumors and are truly benign tumors of embryonic messenchymal origin. The total number of myxomata reported is approximately 204[6,7] which includes recent reports.[5,8-10] The age incidence was from three months to 68 years, the majority being between 30 and 60 years. The sex distribution was equal and Prichard reiterated that cardiac myxomas had never been recognized ante-mortem.[6] Before him, Yater in 1931[11] and Mahaim in 1945[12] reviewed the literature. Myxomas of the heart constitute about 50 per cent of the primary heart tumors. With few exceptions they have occurred in the atria; in the left atrium in 75 per cent. In almost every instance, as in two of our cases the tumor was polypoid and attached by a stalk to the foramen ovale or its rim. Microscopically, myxomas are contained within unbroken endocardium and have few cells. These are usually giant or multinuclear without mitoses and contain loose vascular tissue, hemorrhage, lymphocytes, plasmacytes, mucin staining material and collagen.

Our cases showed many of the clinical features common to the myxomas.[6] Obstruction at the mitral orifice was present in cases 2 and 3 and had at times been suspected in the first case. Two of the most recently reported cases also simulated rheumatic mitral stenosis.[5,9] Another clinical feature, embolic phenomenon is not uncommon and was present in one of our cases.[8] Sometimes thrombi overlie the surface of the tumor or fragments of the tumor break off and may cause emboli to lodge in the brain, lungs, aorta, renal arteries or extremities.[5,6,10] Sudden death due to primary artery embolus from a right atrial tumor has been described.[6] Although, our second patient had four embolic episodes, autopsy study did not reveal

tumor emboli. There were, however, evidences of previous infarction in the left cerebral hemisphere and kidneys. Dexter and Work[13] described a patient with endocardial damage which they attributed to old rheumatic fever. Similarly, case 2 had mitral leaflet with chordae tendineae thickening and shortening. However, as in Dexter and Work's case, there were no Aschoff bodies, endocarditis or pericarditis. Localized trauma of the valve leaflets by the protruding tumor is the more likely explanation for the valve leaflet and chordae tendineae changes. Case 1 developed impure flutter and auricular fibrillation. This occurrence, as in Gillcrest and Miller's case[14] is an indication of atrial disease. Case 2 finally developed intractable heart failure which became unresponsive to digitalis and mercurials, features which have been common in cardiac myxoma.[6,11]

Conventional roentgenographic findings in left atrial myxoma have consisted of cardiac enlargement, prominence and enlargement of the pulmonary artery and left atrium[14-16] In one instance[17] superior vena cava widening and moderate cardiac enlargement was seen in a patient who had right atrial myxoma and died in heart failure. Left atrial enlargement was present in all our patients; in case 1 it was large enough to be evident along the right cardiac border in frontal view (Figure 1) and was mistaken for a right mediastinal tumor. The above roentgen findings, however, are all consistent with the diagnosis of mitral stenosis of rheumatic fever origin. Conventional roentgenography has not been helpful in establishing the diagnosis of atrial myxoma.

Angiocardiography, on the other hand (Figures 2, 5, 8) showed characteristic and persistent filling defects in an enlarged chamber due to an intercavitary tumor which was attached to the interatrial septum. Such changes are not seen in mitral valvular stenosis due to rheumatic fever. Mural thrombi along the right atrial wall or in the left auricular appendage have occasionally been recognized.[18] These, however, never attain the large size of myxomas nor do they occur in the favorite location of myxomas, along the interatrial septum. A recent report describes right atrial filling defects due to the turbulent stream of regurgitating blood through an incompetent tricuspid valve.[19] However, these are but transient defects and therefore should offer no great problems in diagnosis.

SUMMARY AND CONCLUSIONS

Three cases of left atrial intracavitary tumor were diagnosed in life by means of angiocardiography. A constant filling defect in an enlarged atrium with attachment to the interatrial wall was proved at necropsy to be due to a large myxoma in two instances. Because of the polypoid and benign nature of cardiac myxomas, surgical exploration was undertaken in each instance. Death resulted in two desperately ill patients and the autopsies confirmed the angiocardiographic findings. This, as predicted by Mahaim[20] made possible for the first time, the diagnosis of myxoma during life. If the index of suspicion is high and every case of mitral stenosis of obscure etiology and varying murmurs is carefully evaluated, more cases of myxoma will be discovered. With earlier operation, at a time when the patient is

in good general condition, and finally, with advances in intercardiac surgery, especially the mechanical heart and lung apparatus, myxoma may become a curable disease.

RESUMEN

Por medio de la angiocardiografía se diagnosticaron tres casos de tumor del atrio izquierdo, intracavitarios. En dos casos una falta de llenado constante en un atrio crecido, con inserción a la pared interatrial fué demostrado a la autopsia que eran grandes mixomas. En vista de la naturaleza polipoide benigna de los mixomas cardiacos, se emprendió la exploración quirúrgica en cada caso. La muerte ocurrió en dos casos desesperadamente enfermos y las autopsias demostraron los hallazgos angiocardiográficos. Esto, como ha sido predicho por Mahaim[20] hizo posible por primera vez el diagnóstico del mixoma durante la vida. Si se mantiene una alerta constante a este respecto y si cada caso de estenosis mitral de obscura etiología y con ruidos variables es cuidadosamente estudiado, se descubrirán más casos de mixoma. Con operaciones más tempranas, cuando el enfermo está en buenas condiciones físicas y con los adelantos de la cirugía intracardiaca, en particular el corazón y el pulmón mecánicos, el mixoma puede venir a ser una enfermedad curable.

RESUME

Grâce à l'angiocardiographie, les auteurs ont pu diagnostiquer durant la vie trois cas de tumeur de l'oreillete gauche. Deux fois, une oreillette qui paraissait augmentée de volume mais avait un emplissage défectueux, s'est montrée à l'autopsie, en rapport avec un volumineux myxome. Etant donné la nature bénigne des myxomes cardiaques, une exploration chirurgicale à été tentée dans chaque cas. Chez deux malades très atteints, la mort suivit l'intervention et les autopsies confirmèrent les constatations angiocardiographiques. Ainsi, pour la première fois se trouvait réalisé ce qu'avait prévu Mahaim[20] sur la possibilité de faire le diagnostic de myxome durant la vie. Si on sait s'en méfier et si chaque cas de rétrécissement mitral sans étiologie nette, s'accompagnant de variations de signes d'auscultation, était étudié avec soin, on découvrirait plus de cas de myxomes. Grâce à une opération plus précoce au moment où le malade est en bon état général et grâce aux progrès de la chirurgie intra-cardiaque, en particulier à l'existence de coeurs et de poumons artificiels, le myxome pourrait devenir une maladie curable.

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Control of Chest Pain*

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Pain involving the chest causes the patient to seek medical attention with an urgency that is second only to that following hemoptysis. There is frequently anxiety accompanying this pain and the insistence of the patient on relief is completely out of proportion to the degree of pain. The result has been that over the years the physician has yielded to this demand and has directed his treatment toward the relief of the symptom, frequently without regard to the necessities of the underlying conditions and the possible deleterious effects that the treatment may have.

Cupping and leeches were standard procedure in former days and while they may not have improved the underlying pathology, the pain was frequently relieved and no side effects occurred. Later the use of analgesic and sedative medicines superseded these measures. Opium, morphine and its derivatives were found to be effective, both in relieving the pain and the anxiety of the patient and in abolishing the cough which frequently was part of the picture and was responsible for severe painful spasms. Another method which became popular was immobilizing of the chest by binders and adhesive tape strapping. With greater and increasing knowledge of pulmonary physiology and recognition of the changes which accompany various types of pathology, it has become clear that not all methods of relieving pain are desirable and that these methods of treating the pain may aggravate the underlying pathological condition. A second fact which must be remembered is that pathology may be extended or even produced by therapeutic measures which interfere with normal lung function. An approach to the treatment of chest pain must consider in what way this symptom is related to the underlying pathology and how the pain or the pathology affects respiratory function.

The most cursory investigation of this question indicates the complexity of the subject. For we are dealing not with one symptom but a whole variety of symptoms arising out of many different situations. The only point of similarity is the anatomical location, that these are pains which are felt in or referred to the chest.

Not all pain which is felt in the chest is covered by this discussion. Pains may be felt in the chest and are reported by the patient as such. However, they arise elsewhere and should be considered as belonging to other fields of medicine. In this category may be placed the burning or pressure pain customarily felt over the sternum, which is associated with gastric disturbance. Likewise, one would include irritation of the colon which may cause sensation high up under the scapula, gallbladder disease whose subjective symptoms may be referred to chest areas and others. Since these

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can not be logically considered pain arising in the chest, they will be eliminated from the discussion of the management of this condition. They are mentioned here only because of the necessity of determining whether one of these conditions exists before any treatment of the symptom itself occurs.

The pain arising in the chest belongs in several separate categories. The first of these is pain caused by injury or pathology in structures which are involved in the muscular motions of the chest, whether during breathing, coughing or other actions involving skeletal muscles. In this category are found such conditions as injuries to the chest and pleuritis. This is pain which occurs or increases from breathing, coughing, swallowing or other physical movements. There may be relative freedom from pain during such times in which these movements are eliminated or limited. A second type of pain is that felt on the surface of the body but referred from pathological changes in an underlying organ. This is not much influenced by breathing and has a tendency to be constant or recurrent in nature. A third type of pain is that caused by irritation or inflammation of the intercostal nerves.

Although the management of the conditions which caused these types of pain may be different, there are certain basic principles in the control of the symptom itself which do not change much from one condition to the other.

Methods of Treatment:

Narcotics and the strapping of chests are effective means of controlling pain. However, these are so often contra-indicated that it is necessary to find other procedures which will be as effective and which will not have their disadvantages. Such procedures are available. The first and most definite is injecting of the intercostal nerves in the segments of the chest involved. Several substances are available and if used properly result in complete freedom of pain for periods ranging from several hours to a week or more. Among these are procaine, Zylocaine and efocaine. The first named produces anaesthesia of short duration and requires considerable skill in infiltratng the nerve. Zylocaine has the power to spread and be absorbed so that if it is introduced reasonably near the intercostal nerve, enough is absorbed to produce a very satisfying effect. The beneficial effect lasts several hours to a full day and the return of the sensation is gradual. Efocaine belongs to the group of long acting medication. It must be injected very close to the nerve, itself, and the effect will last generally at least a week. This may be desirable in postoperative cases, tumors and similar conditions. It has a distinct disadvantage in the management of pain associated with inflammation or infectious disease where the duration of the symptom may be an important index of the course of the pathology. A serious drawback, which is inherent in the technique itself, and has nothing to do with the type of drug used, is the danger associated with introduction of a needle into the chest wall to a point which actually lies on the parietal pleura.

It is not an uncommon experience to find an area of pneumothorax in

a chest in which a diagnostic aspiration has been done. Sometimes this air has been introduced from the outside when the syringe has been disconnected from the needle but in many cases it is the result of puncture of the visceral pleura as the point of the needle penetrates beyond the rib. It has been demonstrated by Tchertkoff that artificial pneumothorax can be instituted in this manner and his work has been corroborated by many others in the field. When we consider the customary long bevel on the average needle used for any type of chest infiltration or aspiration, it is easy to understand how the parietal and visceral pleura, so closely approximated, may both be pierced in the course of searching for the intercostal nerve. This explains the pneumothorax sometimes seen when an x-ray film is taken within 24 hours of such an infiltration. Since there are many conditions which are associated with chest pain in which any collapse of the lung is undesirable, either because of interference with needed lung function or because of the danger of introducing infection into a pleural space, this procedure of intercostal nerve injection should not be recommended for general use and should be reserved for such cases in which the alleviation of pain is not possible by other safer methods.

There are two approaches which have the virtue of being safe as well as effective. The first of these—anaesthetizing pain areas of the chest—has been worked out and presented by Trevell. In this procedure, trigger areas are located and procaine injected intra-cutaneously in these regions or, as an alternative, more simple procedure, ethyl chloride spray applied to the skin to produce controlled freezing. In the chest, these trigger areas have two main sites. For the intercostal nerves, they are found in a region in the corresponding segment at about one inch lateral to the dorsal spine. For the precordium they exist in the region of the pectoral muscles.

The exact spot may frequently be found by palpation which demonstrates an area of recognizable tenderness. If procaine is injected at this site, far removed though it be from the spot where pain is felt, relief is almost immediate and the improvement will last for several hours. Because of its ease of application, ethyl chloride spray is more practical than the injection of procaine. This is likewise applied to the trigger area. The spray should be applied from a distance of not less than 24 inches with circular motion and hitting the skin at an angle rather than perpendicularly. An area well above and below the exact site should be sprayed. When frost appears, it should be wiped off with gauze. It is more effective to apply the spray for 10 or 15 seconds and then wipe off the skin, following this by another application. The time of the procedure will depend upon the degree of relief of pain secured. It is generally possible to eliminate pain entirely. However, it is important that actual freezing of the skin does not occur since this is both unnecessary and the cause of later irritation.

The second method recommended is even simpler than the above techniques. It consists of the application of heat to the area which is painful and, in severe cases, to the trigger area as well and following this with the application of an analgesic rub over these same areas. In cases where heat is contra-indicated for any reason, the rub may be applied alone.

Although the relief is not as rapid nor as spectacular as either of the above techniques, it is definite and will last for periods ranging from three to six hours.

There are many such substances available and the results are uneven with different products. In the cases discussed in this paper, a particular analgesic rub has been used, Rub A-535.* It has been found to be effective in a wide variety of conditions. It is non-greasy and has a vanishing absorbable base thus insuring almost instant utilization of its active ingredients. Because an attempt was made to determine the effectiveness of this method, this rub was used with and without heat, in similar types of cases. The effectiveness is greatly increased when heat has been applied to the area previously, whether by heating pad, infra-red lamp, or other method. The rub is applied over the previously heated area and it is not necessary to use vigorous or heavy massage. The region may then be covered by a heavy Turkish towel or some similar material.

Pain Associated with Chest Motion:

Pain originating with or increased by muscular motion of the chest is generally associated with those structures which are put under strain or moved when the chest cage is moved. These are the pleura, the ribs, the intercostal muscles and the diaphragm. It is worth nothing that, although pain caused by irritated or inflammed intercostal nerves falls into an entirely different category, this pain may also be increased on muscle motion or shifting of the chest cage. It is important to differentiate these, since the response to treatment is very different. If the chest is immobilized by pressing a hand on the rib cage or simply by cessation of respiration in the position of expiration, the origin of the pain may be tested. If there is disturbance or inflammation of the pleura, ribs, or muscles, the patient will exhibit marked relief when the chest is immobilized. On the other hand, the pain caused by irritation of the nerve itself is not much improved by this.

Since immobilization relieves the pain, such a procedure is one of the most popular methods of treating one of these conditions. The customary method is adhesive tape strapping, although a circular bandage completely around the chest is preferred by some. There is no question that this alleviates the pain, but if the physiology of the lung is considered in line with the pathological condition, there are many objections to its use.

One of the most important functions of ventilation, in addition to its basic purpose, is that of drainage of the lung and elimination of undesirable material from the bronchial tree. This is performed through the motions of inspiration and expiration. Since the bronchi change in length and diameter with each phase of inspiration, these motions aid in elimination of secretion. Any time the chest is immobilized, this type of drainage is lost and there is a tendency for secretion to be retained, particularly in

*Rub A-535 was kindly furnished by the Denver Chemical Manufacturing Co., Inc. for the study.

dependent areas. If you add to this the splinting of the chest normally caused by pain and sometimes also fixation of the diaphragm, it is easy to realize that a considerable retention of secretion will take place. When inflammatory reaction occurs in the lung or the bronchi, infection is likely to be present in addition to retained secretion. This is the reason why an excess of narcotics is frowned upon in the treatment of chest pain. It is axiomatic that treatment with morphine or codeine or any one of the special derivatives is likely to produce stasis of secretion, pneumonic infiltration or patchy atelectasis. The very same reasoning that prohibits the use of narcotics should likewise prohibit the immobilization of the chest by any mechanical or reflex procedure. The optimum treatment would inhibit the pain and the pain only.

This can be accomplished by nerve block, superficial procaine injection, the application of ethyl chloride to trigger areas, or the use of an analgesic rub over the involved region. All of these are effective. The duration of their effect will vary. Nerve block is efficient but should be recommended in the most severe cases only since other and more simple procedures are available. For the severe case it is probably better to use the subcutaneous or intracutaneous injection of procaine or the application of ethyl chloride spray. These should be applied to "trigger areas" not to the entire area of pain. Neither procaine nor ethyl chloride produce permanent relief. The pain may return in a period that varies anywhere from one hour to 24 hours. If pain returns rapidly it is not desirable to continue this type of treatment. For this reason when the pain shows signs of returning the patient should be instructed to apply analgesic rub to the involved area.

It may be worthwhile, except in severe cases, to use such a rub first before attempting one of the more complex methods of controlling the pain. Frequently even severe pain will be alleviated by this means. The procedure recommended previously should be followed. Shortly thereafter the patient will begin to feel increased sensations of warmth and an alleviation of pain. Such improvement is illustrated by the following case history.

C. A., age 36, is a severe asthmatic, subject to attacks of spasmodic cough. This cough would be violent and non-productive. During such an episode she fractured the eighth and tenth ribs on the left side. This was the third time such an accident occurred. Previous studies as well as studies at this time indicated no pathology in the bone. Her bronchial tree was filled with sticky secretion and there was evidence of some infection. The pain was so severe that it made both breathing and coughing difficult, both of which were obviously necessary for ventilation and oxygenation of the blood. Any narcotic was definitely contra-indicated. The presence of the asthma and the large amount of sticky secretion made strapping of the chest a highly hazardous procedure which would probably be followed by serious complications. For this reason one application of ethyl chloride was applied over the region from the 6" to the 12" thoracic spine, about one inch to the left of the midline. Relief was rapid and a more adequate ventilation was possible. However, such relief could only be temporary and she was instructed to apply heat and the analgesic rub at the first return of sensation. She followed this routine for one week, using the rub every three hours for the first 24 hours and decreasing after that to an average of three times a day after four days. At the end of one week, the pain was felt only on severe cough or sudden movement.

Pleurisy:

Inflammation of the pleura, whether caused by infection or irritation, is one of the commonest causes of pain in the chest. Pleuritis accompanying various types of respiratory infection sometimes occurs almost in epidemic form. Associated with pneumonia, tuberculosis or other deep chest infections, it is considered a routine part of the clinical picture by the physician. The patient, however, is much more disturbed and apprehensive when the pain of pleuritis accompanies chest infection. He is awakened at night by the pain, whether associated with coughing or turning over, and throughout the day he never loses the feeling that something is wrong. The pain then takes on the magnitude of a major symptom and the patient demands relief.

In the management of respiratory infection it is axiomatic that the cough should not be suppressed since it is necessary to eliminate the infected material and since a certain amount of secretion is developed every hour in the process of resolution of the inflammatory exudate. For the same reason, anything that would tend to diminish the respiratory excursion of the lung or the ventilation of the lobe or lobes which are infected is likewise contraindicated. Such limitation of lung function tends to aid the retention of secretion and when secretion is retained in the bronchi, it will spill over into uninvolved areas extending the infection or to produce localized atelectasis. The same objection exists for immobilization of the chest or the use of narcotics in pleuritis without obvious demonstrable lung pathology. It is hard to conceive of inflammation of the pleura without some involvement of the lung beneath. It is therefore likely that interference with the normal methods of drainage and ventilation might prolong a pathological process rather than improve it.

The plan of treatment should follow that of pain caused or increased by the motions of ventilation. The intercostal nerves may be injected, trigger areas treated with ethyl chloride or procain, or an analgesic rub may be used. It should be emphasized that the danger associated with the intercostal injection of nerves is perhaps greater here than in the case of muscular pain. As stated before, it is not unlikely that the injection needle may pierce the parietal and visceral pleura to produce traumatic pneumothorax. If there is infection in the underlying lung, this makes possible the transmission of this infection directly into the pleural space and the subsequent development of infected fluid. Such cases have been observed. For this reason, intercostal nerve injection should not be a routine procedure in the pain of pleurisy. It is not the substances which are injected which may be dangerous but the needle itself. If there were no other method of controlling this pain safely, the hazard might be justified by the result but, since the pain can be controlled easily by other methods, it would not seem justifiable to use this technique routinely.

Immediate and definite relief of the pain may be accomplished in the doctor's office, patient's home or at the hospital, by the application of ethyl chloride to the trigger area of the corresponding segment. This should

follow the procedure described previously. Care should be taken that a wide enough area is treated and that the skin should not suffer too great an effect of freezing. The injection of procaine in this area will likewise produce an immediate and definite relief of pain. Since it is not desirable to repeat this many times, it should always be followed up by the use of analgesic rub. This should be applied to the area which is painful and, also, to the same trigger areas lateral to the spine. The relief from pain that follows such an application is quite striking and the freedom of motion of the chest as well as the muscles of the back and the arm enable the patient to breathe, cough and move about comfortably.

The patient should be instructed to repeat this rub whenever the pain returns. Here there is no localized area of tenderness sensitive to touch as is found in fractures. Consequently, it is not necessary to repeat the therapy at the first sign of pain. It is generally more desirable to wait until the symptom has returned with sufficient severity to justify another treatment. It is noticeable that without any narcotic medication, the patient may be completely free of pain and the time between treatments will be constantly increased until the pain is eliminated entirely. This is illustrated by the following case report.

B. M., age 42, was found to be suffering from a respiratory infection of the influenza type accompanied by a deep bronchial or bronchopulmonary involvement with the production of much thick secretion. He had a severe spasmodic cough, sometimes associated with wheezing. At the end of the first 24 hours of this condition, he began to complain of severe stabbing pain in his left chest which occurred on cough or deep inspiration. It was not present when he held his breath or when the chest was immobilized by pressure. Upon examination, a pleural rub was heard in this area. X-ray film showed no definite pulmonary pathology or any evidence of fluid. Fluoroscopy indicated splinting of the chest and of the diaphragm. It was felt that enough of any narcotic substance to eliminate the pain would interfere seriously with the mechanism of cough and expulsion of this thick bronchial secretion. The same objection applied to strapping of the chest. He was instructed to apply heat to the left chest and back and to follow this by the application of the recommended analgesic rub. During this treatment, and the administration of antibiotics, he was likewise confined to bed. He reported relief from pain shortly after the first application of the rub and that he slept comfortably without the need for sedation. Throughout the next day, he found it necessary to repeat the treatment four times and again had a comforable night. The following day the rub was used twice and once or twice a day within the next three days. Following this, there was no return of the pain.

This case is reported since it represents the simplest and easiest method of controlling the pain of pleuritis and as a demonstration that the use of the analgesic rub alone is frequently completely successful. Similar results have been obtained in the acute pleural pain associated with spontaneous pneumothorax or the re-expansion of a collapsed lung. It would seem to be important that this technique eliminates the need for sedation or the use of narcotics.

It may be, and it has been the experience of many men, that narcotics may be used safely in similar situations. It would seem logical, however, that if these drugs do, as we know they do, interfere with functions that

aid in the reparative process, their use can not be considered an unmixed blessing. Occasionally demonstrable trouble will occur. In a large number of cases, the rapidity of improvement will be interfered with and certainly, in any case, it can not be said that it aids in the actual recovery of the patient. The availability of such a simple and safe procedure would argue against the use of narcotic drugs in any case of pleurisy.

Muscular Soreness:

We are well acquainted with the pain experienced in the muscles of the arms, legs or back which follows their excessive use. Muscle stiffness or soreness following exercise or work around the house is an expected event and occurs frequently in the early days of spring. Such a symptom may likewise occur in the chest, particularly in patients who have been removing storm windows and doors, painting ceilings or performing other activities which entail the frequent lifting of the arms or the crossing of the arms over the chest. The man who early in the season decides to limber up his golf game and spends an hour or so practicing driving is likely to notice within the next two to three days quite a lot of pain and soreness over his left chest, back and shoulders. This is not infrequently mistakenly considered as a symptom of possible coronary disease. When such a condition has been eliminated and when the muscles in this area are sore and sensitive to touch not only by pressure on the chest but when they are picked up between the fingers and palpated, the clinical picture is that of muscle soreness in the eager but unaccustomed athlete. A similar condition is frequently associated with the intercostal muscles. As any old athlete knows, the relief of sore muscles is most quickly accomplished by massage and more exercise. This is frequently not a practical recommendation to the business or professional man. The application of heat is always beneficial. If this be followed by the analgesic rub, the patient experiences a lasting relief and can use the muscles of his arms and chest freely. Such reaction will hasten recovery and disappearance of the symptom.

Referred Pains:

Pain referred to the surface of the chest as the result of actual chest pathology is a much more serious and difficult symptom to handle. Typical of this category is the pain around the shoulder girdle. This is not uncommon in tuberculosis. Similarly, the pain in the chest which occurs in certain bronchogenic carcinomas presents a problem in therapy. In these latter cases, there is a temptation to use narcotics indiscriminately since the obviously poor prognosis gives one a feeling of futility and frustration and the customary observation is that the patient might as well be comfortable. What harm can it do? The difficulty arises when the patient does not succumb with the rapidity that is anticipated and the doctor is faced with the physical and psychological problems that make up the picture of drug addiction.

This type of pain is much more difficult to control. The use of any of

the narcotic drugs ought to be kept as a last resort and other methods attempted first and continued until the effectiveness is eliminated. Where the pain is in the lower portion of the chest, the injection of the intercostal nerves brings definite relief. The long lasting drugs are to be recommended as the material of choice. Chief among these would be efocaine which can be injected into the suitable intercostal nerves. If, for any reason, such injection is not desirable either because of its frequent repetition, lack of cooperation on the part of the patient or for any other reason, the same techniques which are helpful in the treatment of other chest pains will demonstrate some effectiveness here.

The proper and careful use of ethyl chloride over trigger areas will relieve the patient almost immediately. It is curious that in this type of pain, which has been so constant, the type of reaction following such a treatment is entirely different than that of injury or inflammation. In this latter group, the patient reports almost immediately that his pain is gone and he breathes comfortably. The tumor patient almost invariably says that he doesn't know. He thinks it is less. In response to direct questions, he will say: "No, it doesn't hurt so much but I am not sure that it is gone."

The duration of the effect in tumor cases is more transient than in the inflammatory ones. If this is followed up by the use of the analgesic rub some additional relief is obtained. This is extremely irregular—some patients report absolutely no improvement while others will show relief varying from slight to complete elimination of the symptom. The effectiveness of this type of therapy does not last for a great period of time. In some cases, after the first few days, there is no further relief from repetition of the rub. In others, relief of pain will continue over a period of many weeks. In these cases, it would appear that the application of heat for at least one-half an hour preceding the use of the rub aids considerably in its effectiveness.

Tuberculosis and Other Lung Diseases:

In the referred pain associated with inflammatory diseases in the chest, there is a tendency to feel that sooner or later this will improve and that the patient will feel better if he remains quiet in bed with no medication. The exact antithesis of this is just as frequently found where large amounts of codein or other drugs are given so that the patient may be comfortable and not suffer from unnecessary pain. In this type of patient strapping of the chest may not cause any aggravation of the disease but, what is much more important to the patient, it produces little if any relief from the pain. In these cases, the use of the analgesic rub is particularly valuable. Whether or not it is preceded by the application of heat will depend on the feeling of the physician in the particular case. In this particular study, I have not hesitated to apply heat to the chest of patients with tuberculosis and have not observed untoward events. It has never been followed by hemoptysis, elevation of temperature or increased activity of the disease. It may well be that the general use of antibiotics in tuberculosis

has prevented the unpleasant sequela of the application of heat which might be anticipated.

Pain associated with cardiac disturbance is sometimes chronic in nature, requiring specific treatment. The severe pain of the acute attack is another problem entirely and is associated with the management of the acute episode. It is the anginal type of pain occurring constantly over long periods in the patient with coronary insufficiency that brings up the problem of management of the pain as a separate entity. It is neither feasible nor desirable to use narcotics over a long period nor to recommend the constant use of vaso dilators such as nitroglycerin. If the patient has returned to or remains in fairly good clinical condition and there is no particular evidence justifying continued bed rest, it is frequently the pain alone that is the troublesome symptom. This will often respond to the application of ethyl chloride spray or procaine to the trigger area found in the left pectoralis region. Considerable relief has also been secured, using the analgesic rub over the same area. Since this relieves the pain without producing anaesthesia, it does not eliminate the danger sign of the sudden appearance of severe pain. It may thus aid the patient without interfering with medical observation.

Intercostal Neuritis and Neuralgia:

Intercostal neuralgias and myalgias are not uncommonly seen in certain seasons. When so-called virus infections are common, such a condition may be a very frequent occurrance. The pain is easily recognizable by its following the course of an intercostal nerve and similarity to the neuralgia so commonly seen in the arms and shoulders. When the more serious pathological conditions which may cause such a symptom have been satisfactorily ruled out, or even during the course of such a work-up, the symptom of itself can be treated to relieve the patient of unnecessary pain. Injection of the nerve with any one of the recommended drugs will of course eliminate the pain. This however appears to be too much of a procedure for such a simple condition particularly when it will respond rapidly to the application of heat and the analgesic rub. The procedure should follow the recommended technique and the patient instructed to use it whenever indicated. The underlying pathology, if any, will of course be treated concurrently. There is one danger in this treatment which must not be overlooked. The patient may develop the tendency for self-medication if such a symptom occurs in himself or in another member of his family. Consequently he should be warned that pains are the result of some type of pathology and that such medication only relieves the symptom and has no effect whatsoever on the underlying cause.

Actual inflammation of the nerve, itself, or of the nerve root is a different matter entirely and a difficult and troublesome condition. This is the familiar picture of the intractable pain which sometimes follows thoracic surgery. For the relief of such pain, proper techniques of nerve block should be attempted. Other procedures have not been found to be of great benefit in relieving this condition. It is worthy of note that many of these patients

who suffer severe pain have a tendency to secure relief, apparently spontaneously, after the passage of periods of time. It is advisable therefore to attempt to carry the patient over this period with medication or procedures which will relieve the symptom associated always with a definite building up of the general condition of the patient and the improvement of his constitution status. Narcotics are contra-indicated. It is difficult, once such an addiction has occurred, no matter how slight, to determine whether the patient is really suffering pain. The technique of nerve block in this type of case is too detailed to justify discussion here. The reader is referred to the articles which have been written on that subject. A very occasional case may find considerable relief by the use of the analgesic rub following ethyl chloride spray over the proper trigger areas. Methods designed to relieve pain in the chest must keep pace with the demand of the patient that the pain be improved. Since he is not content to wait 24 or 48 hours for relief, procedure and medications must be designed to relieve this pain in a matter of minutes rather than hours.

SUMMARY

The review of the major group of the conditions causing pain which has just been presented illustrates one major point. While the elimination of the pain will depend on the removal or successful treatment of the pathology which has caused it, this pain is a symptom and as such can be safely treated regardless of what its origin may be. It is impossible to overemphasize the undesirability of narcotics or of chest immobilization in any case of bronchial or pulmonary pathology. The same contra-indication obviously exists in the absence of such pathology since it will be conducive to, if not directly responsible for initiating new disease. Successful treatment of chest pain can be accomplished without any such hazard. The procedures outlined which have been proved effective and safe are the injection of intercostal nerves, anaesthesia of trigger areas and the use of analgesic rubs. It is important to remember the hazard of intercostal injection, not from the drug used, but from the point of the needle, itself, and such injection employed only in suitable cases. In most cases, the anaesthetizing of the trigger area by the method of Trevell, using procain or ethyl chloride will cause immediate relief. Since this relief is relatively transient this procedure should always be followed by an application of the analgesic rub in the manner recommended. In a great many cases—in fact, in almost all of the cases falling into the category of muscle and bone injury, inflammation, pleuritis, or pain referred from inflammatory diseases, the symptom can be completely relieved by the proper application of a suitable analgesic rub following the application of heat. We have not found equal effectiveness in all substances tried. Some of the ointments which advertise their properties as mighty pain killers were found to be relatively ineffective. Much more work needs to be done to determine whether it is absorption of substances through the skin which produces the relief or whether it is some particular action on the nerve endings in the skin. No toxic effects or any other untoward reactions were observed

in any of the patients who have been treated by this means during the past three years. There would seem to be no reason to fear any such complications and it appears that such an approach to the management of chest pain would eliminate rather than cause complications. It is a technique that is easily applicable and requires no special training in its use.

In this day when we are placing so much emphasis on silent pathology it would not seem necessary to issue an additional warning. Because of certain observed cases, I feel that this must be done. It is the warning that in relieving pain, it is only a symptom that has been removed. The ease of elimination of this symptom does not relieve the physician of the responsibility of following through the necessary steps for adequate diagnosis of underlying pathology. It is important that this be done regardless of the wishes of the patient who frequently believes that once he feels better nothing more is necessary. Cases of bronchogenic carcinoma, tuberculosis, and other types of chest pathology have been found in patients who submitted to x-ray and work-up only on the insistence of the physician, despite their own statement that they felt perfectly well and needed no additional treatment.

RESUMEN

Una revisión del grupo mayor de afecciones que pueden causar dolor señala un punto de importancia grande. Si bien la eliminación del dolor, depende de la supresión de la causa patológica o de su tratamiento efectivo, este dolor, es un síntoma y como tal, puede tratarse seguramente sin tener en cuenta su origen. Es imposible acentuar lo indeseable que son los narcóticos o la inmovilización del tórax en caso de afecciones broncopulmonares. Es evidente que la misma contra-indicación existe en ausencia de esas afecciones, puesto que puede conducir a la aparición de una afección por sí. Se puede tratar con éxito el dolor torácico sin tanto riesgo. Los procedimientos que se han señalado y que han dado buen resultado, son la inyección de los nervios intercostales, la anestesia de las áreas de "gatillo" y el uso de las fricciones analgésicas. Es importante recordar el riesgo de las inyecciones intercostales, no en razón de la droga usada, sino por la punta de la aguja misma y tal inyección debe usarse en los casos adecuados solamente. En la mayoría de los casos la anestesia de las áreas "gatillo," por el método de Trevell, usando procaína o cloruro de etilo, causan alivio inmediato. Puesto que este alivio es sólo relativamente transitorio, debe ser seguido del empleo de una fricción analgésica de la manera recomendada. En muchos casos, de hecho en casi todos los casos correspondientes a lesiones óseas o musculares, inflamación, pleuritis, o dolor proyectado de enfermedades inflamatorias, los síntomas pueden ser aliviados completamente por la aplicación de una fricción analgésica después de la aplicación de calor. No hemos encontrado igual efectividad en todas las substancias empleadas. Algunas de las anunciadas como muy efectivas, son relativamente, ineficaces. Falta aclarar si el efecto se debe a absorción a través de la piel, o efecto sobre las terminaciones nerviosas. No se han encontrado efectos tóxicos por estos métodos en los últimos tres años. Tampoco hay que temer

complicaciones al tratar así el dolor torácico. Ahora que se hace especial llamado sobre la patología silenciosa, debemos advertir algo, y es que al aliviar el dolor, sólo se suprime un síntoma. Esto no elimina la responsabilidad del médico que lo obliga a buscar la causa.

Se conocen casos de carcinoma bronquiogénico en los que se ha llegado a diagnóstico sólo por la insistencia de un médico, cuando el enfermo había asegurado en que se sentía perfectamente bien, después de aliviado su dolor.

RESUME

L'étude des éléments essentiels qui peuvent causer des doupermet d'illustrer un point capital. S'il est exact que la suppression de la douleur dépend de la suppression ou du traitement efficace de la lésion qui en est responsable, il n'en est pas moins vrai que la douleur est, à elle-seule, un symptôme et peut être traitée à ce titre sans tenir compte de son origine. Il à déjà été suffisamment entendu que les produits calmants ainsi que l'immobilisation du thorax, ne sont pas souhaitables dans les cas d'atteintes bronchopulmonaires. Même en l'absence d'une telle atteinte la contre-indication existe car ces moyens thérapeutiques peuvent amener l'établissement d'un nouvel état pathologique. On peut obtenir un traitement actif de la douleur thoracique sans prendre de tels risques. Les moyens, dont l'efficacité à été prouvée et qui ne comportent pas de risques, sont l'injection des nerfs inter-costaux, l'anesthésie des zones sensibles-réflexes et l'utilisation d'application d'emplâtres anelgésiques. Il est important de se rappeler que l'injection inter-sostale comporte quelques risques, non pas tant à cause des produits utilisés qu'à cause de la piqûre elle-même; il ne faut donc employer ce procédé que dans les cas où il est particulièrement indiqué.

Dans la plupart des cas, l'anesthésie de la zone réflexogène, selon la méthode de Trevell, donne un résultat favorable immédiatement, soit en utilisant la Novocaïne, soit le Chlorure d'Ethyl. Etant donné que cette amélioration est relativement transitoire, ce procédé devrait toujours être suivi par une application d'un emplâtre anesthésique selon la technique recommandée. Dans un grand nombre de cas et en fait dans la plupart de ceux qui concernent les traumatismes musculaires ou osseux, les inflammations, les pleurésies ou les douleurs dues à des maladies inflammatoires, les symptômes equvent être complètement apaisés par l'utilisation convenable de l'emplâtre anesthésique suivant l'application de la chaleur. L'auteur n'a pas trouvé une efficacité comparable dans tous les produits essayés. Certains, considérés comme très efficaces contre les douleurs, se sont montré assez peu actifs. De nombreux travaux sont encore nécessaires pour déterminer si la guérison provient de l'absorption des substances à travers la peau ou s'il s'agit d'une action particulière sur les terminaisons nerveuses intradermiques. L'auteur n'a observé ni effet toxique, ni aucune réaction fâcheuse chez les malades qui ont été traités par ces procédés ces trois dernières années. De telles complications ne sont pas à craindre et un tel procédé de suppression de la souffrance demande à être appliqué dans les douleurs thoraciques d'autant plus que la technique est très facilement réalisable et ne demande aucun entraînement particulier.

A notre époque où l'on sait l'importance que l'on doit accorder aux affections latentes, il ne semblerait pas nécessaire d'ajouter un avertissement supplémentaire. L'auteur pense, toutefois, qu'il faut le faire à la suite de certains cas observés. Il s'agit d'affirmer encore que par la suppression de la douleur on n'a pas supprimé aucun symptôme. La faculté d'éliminer le symptôme ne doit pas libérer le Médecin de la responsabilité de rechercher d'une façon progressive quelle est la lésion sous-jacente afin de faire un diagnostic approfondi. Il est important d'agir ainsi sans tenir compte des désirs du malade qui s'imagine fréquemment qu'à partir du moment où il sent mieux il n'est pas nécessaire d'aller plus loin dans les recherches. On à trouvé des cancers bronchiques, des tuberculoses et d'autres formes d'affections thoraciques chez des malades qui ont été examinés radiologiquement uniquement sur l'insistance de leur Médecin alors qu'ils affirmaient être parfaitement bien et qu'ils n'avaient besoin d'aucun traitement supplémentaire.

The Use of the Iso-nicotinic Acid Hydrazides in the Treatment of Tuberculosis*

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Introduction

The iso-nicotinic acid hydrazides are valuable agents against tuberculosis exerting a powerful bacteriostatic action on the tubercle bacillus,[1] diffusing readily into the cerebro spinal fluid,[2] concentrating (as demonstrated by tissue cultures) effectively within macrophages[3] and absorbed after oral administration without gastro-intestinal irritation. Such a combination of desirable attributes has not been exhibited by any other drug used in the treatment of tuberculosis. However, evidence has been presented that tubercle bacilli may become resistant[4] to iso-nicotinic acid hydrazides after a therapeutic period of two months or less, especially in cases of chronic cavitary pulmonary tuberculosis; such bacterial resistance has usually been associated with clinical relapse. To prolong the beneficial action of the hydrazides, combined therapy with streptomycin and/or para-aminosalicylic acid has been suggested.

This report describes the clinical response of 50 patients with pulmonary or extra pulmonary tuberculosis to treatment with the isoniazid drugs** alone or in combination with streptomycin and/or PAS. All patients were treated on the general medical and tuberculosis services of the Tulane division of the Charity Hospital of Louisiana at New Orleans. Twenty-nine patients were negroes, 21 were whites; there were 25 females, 25 males. Most of them were between the ages of 10 and 40 years; the youngest was two years old, the oldest 73.

The sites of disease in our cases are listed in Table I. All of the acute pulmonary patients were Negroes.

Treatment Regimens

Forty-four patients received 4 mgm. of one of the new drugs per kilo of body weight; six were given 8 mgm. per kilo. Five were treated with iso-nicotinic acid hydrazides alone while the others were given combined therapy as listed in Table II (for the sake of brevity, isoniazid is abbreviated "INAH" and its isopropyl derivative "IPH").

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**Generously supplied by Hoffman-LaRoche, Inc., Nutley, N. J., as "Rimifon" and "Marsilid" and by Chas. Pfizer and Co., Brooklyn, N. Y., as "Cotinazin".

TABLE I: SITES OF DISEASE

	Negro	White
Acute pulmonary	5	0
Chronic pulmonary	17	14
Upper respiratory	1	1
Intestinal	0	1
Lymph nodes	1	1
Serous membrane	5	0
Osseous	0	2
Meningeal	0	2
TOTAL	29	21

TABLE II: DRUG COMBINATIONS

INAH and PAS	15	
INAH and Streptomycin	1	
INAH, Streptomycin and PAS	17	
IPH and PAS	9	
IPH, Streptomycin and PAS	3	
TOTAL		45

Administration of Combined Therapy

A second drug (usually para-aminosalicylic acid) was added to INAH or IPH after a definite clinical response had been obtained. This usually occurred about one month after INAH or IPH was started. Where PAS produced toxic effects, streptomycin was used instead.

In 14 cases with chronic pulmonary tuberculosis, long term treatment with streptomycin and PAS was still being given when INAH became available. Because of the advanced disease encountered in this group and the possibility that the original drugs might still have some therapeutic power, the use of both drugs was continued after treatment with INAH was instituted.

In previously untreated tuberculous meningitis INAH, streptomycin and PAS were given simultaneously without intrathecal use of streptomycin.

Diagnostic Data

The diagnosis was established by one of the following methods: smear; culture; biopsy. Progress was judged by clinical and roentgenographic response and by repeated smears and cultures. There were no facilities for the study of bacterial sensitivity to the chemotherapeutic agents used.

Results

Table III lists results according to therapeutic regimen employed. In Table IV the results are classified according to type and location of disease.

TABLE III: THERAPEUTIC REGIMEN EMPLOYED

	Improved	Unimproved	Relapsing
INAH alone	3	0	0
IPH alone	2	0	0
INAH and PAS	12	1	2
INAH and Streptomycin	1	0	0
IPH and PAS	9	0	0
INAH, Streptomycin and PAS	14	2	1
IPH, Streptomycin and PAS	3	0	0
TOTAL	44	3	3

TABLE IV: TYPE AND LOCATION OF DISEASE

	Improved	Unimproved	Relapsing
Acute pulmonary	5	0	0
Chronic pulmonary	25	3	3
Upper respiratory	2	0	0
Intestinal	1	0	0
Lymph nodes	2	0	0
Serous membranes	5	0	0
Osseous	2	0	0
Meningeal	2	0	0
TOTAL	44	3	3

Analysis of Results

The term "unimproved" (Tables III and IV) has been applied to those cases in which symptoms were unchanged, the x-ray films showed no resolution and sputum smears remained positive for acid fast bacilli.

Those cases with exacerbation of symptoms or unfavorable radiologic appearance after earlier improvement were regarded as relapses. In all three such cases, relapse occurred within five months of treatment. One of these patients is dead.

Unfavorable Results

Table IV indicates that a poor response to treatment in this series occurred only in cases of chronic pulmonary tuberculosis. This group of patients had symptomatic pulmonary tuberculosis for at least two years, including some with very extensive destructive disease. A number of them had large doses of streptomycin before PAS was available; patients given PAS usually had received more than 100 grams of streptomycin. The group also included several patients treated surgically without success. Only six of the 31 patients with chronic pulmonary tuberculosis relapsed or failed to improve, although many must have been streptomycin resistant. Of the

six failures one had relapsed long before when treated solely with streptomycin and the other five had deteriorated while receiving prolonged therapy with streptomycin and PAS. All had demonstrable cavities for long periods of time: one was a lobectomy failure and another had had an unsuccessful thoracoplasty; three others had extensive cavitary disease.

Favorable Results

Patients were classed as improved when they became afebrile, developed good appetite, regained weight and strength, and showed bacteriological and roentgenological evidence of healing. Forty-four fell into this group of whom 30 had pulmonary disease and in 14 the involvement was chiefly extra pulmonary. Of the pulmonary patients who responded favorably to treatment 25 had chronic tuberculosis; the remaining five had had clinically evident disease for less than four months.

The severity of the lesions in the chronic cases varied from almost complete destruction of a lung to persistent isolated cavities without much associated tissue damage. Most of the patients had fever and all had profuse expectoration when treatment was begun. Eleven of the patients had repeated episodes of hemoptysis. All except two had previously received large total doses of streptomycin and PAS. Clinical improvement was noted early in these patients and was usually definite at the end of one month. In a few cases the response was slower but was rarely delayed for more than two months. Improvement was characterized by reduction of cough and expectoration and cessation of hemoptysis. Sputum concentrates became negative or acid fast bacilli were found with difficulty. Roentgenographic signs of improvement occurred in practically every case. The extent of the lesions diminished, poorly circumscribed elements became discrete, and cavities became smaller while fluid levels disappeared (Figures 1A and 1B).

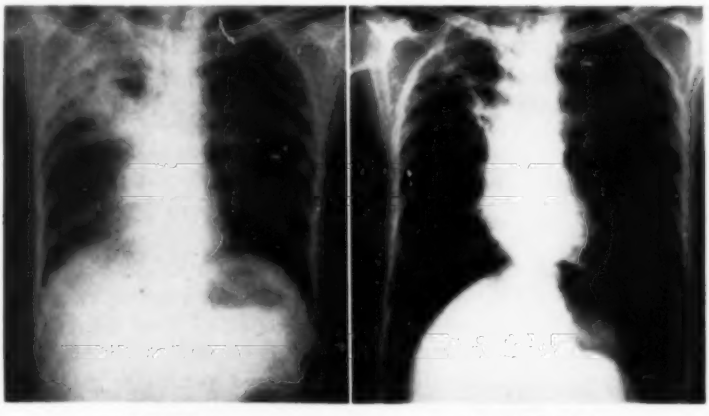

FIGURE 1A FIGURE 1B

Figure 1: G.H., 53-year old white female. (1A): March 20, 1952. Acute exacerbation of chronic tuberculosis of right upper lobe. (1B): September 8, 1952. Disappearance of acute inflammatory elements on isoniazid and para-amino-salicylic acid.

One with a persistent right upper lobe cavity which developed after left pneumonectomy showed remarkable improvement in one month; the cavity shrank and filled with inspissated material; cough, expectoration and hoarseness disappeared and bleeding, which had been frequent, ceased.

Favorable responses occurred in all five patients with acute pulmonary involvement. There was subjective improvement within one week. Three were afebrile by the end of two weeks and showed definite signs of improvement. The other two, although cough and expectoration were reduced, continued to have low-grade fever for almost two months; despite the persistence of fever, clearing was noted on roentgen films taken six weeks after the institution of treatment and has been progressive over a period ranging from five to seven months (Figures 2A and 2B). At present all five are without cough; the small amount of sputum they produce is negative for acid fast bacilli by concentrate. Their films show marked reduction in the extent of involvement, cavities are much smaller or are no longer visible and nodules have usually disappeared. The persistence of a zone of contracted lung tissue has usually been observed in those who had consolidations or confluent bronchopneumonic lesions when first treated.

Improvement occurred in every member of the extra-pulmonary group. A prompt favorable response was obtained in the five with diseased serous membranes; two of these patients had pericarditis; two had pleurisy with effusion and the last peritonitis. Fever disappeared and there was symptomatic recovery within two weeks; no aspirations after the original diagnostic tap were required. The patients remain asymptomatic and without any gross evidence of disease after periods ranging from two to seven months.

Improvement in two cases with meningitis was definite after two months of therapy. One of them, an infant, has been maintained on oral INAH

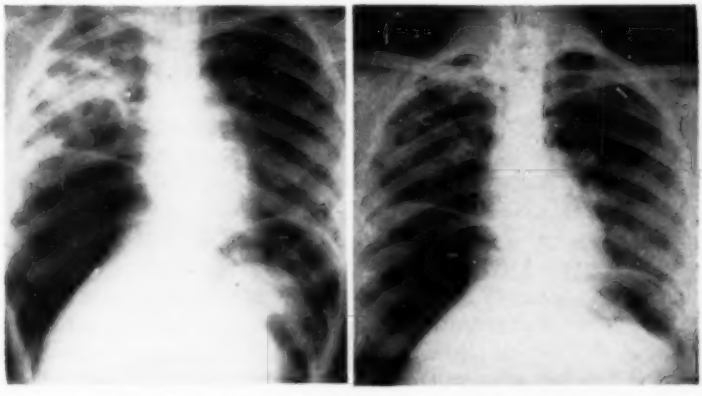

FIGURE 2A FIGURE 2B

Figure 2: R.L.T., 20-year old negro female. (2A): June 16, 1952. Acute exacerbation of chronic tuberculosis of right lung with pleural effusion. (2B): October 9, 1952. Clearing of acute pulmonary and pleural lesions in less than four months on isoniazid, streptomycin and para-amino-salicylic acid.

alone and has been followed for seven months; this patient had left hemiplegia when treatment was started after intramuscular and intrathecal streptomycin and PAS had failed. The left upper extremities no longer spastic; the spinal fluid contains only eight cells per cubic millimeter, and the protein is normal. The other patient, an adult, appears to have recovered completely. She has been followed for seven months. Her treatment consisted of IPH, streptomycin and PAS without intrathecal injections.

Patients with mucous membrane involvement responded promptly to treatment. A superficial ulcer of the soft palate was covered within three weeks and normal laryngeal appearances was restored in two patients within a month. A favorable but slower response was obtained in a streptomycin-resistant case with hyperplastic ileo-cecal tuberculosis. This patient's daily bowel movements have decreased from over 30 to four; he has regained his weight and strength and is no longer bedridden. He has been followed for seven months.

Sinuses from diseased bone and lymph nodes closed promptly in three cases; this improvement has been maintained for five to seven months. Another patient has a persistent sinus communicating with a bronchopleural fistula through an empyema pocket; the purulent discharge has markedly diminished. Two cold abcesses of lymph nodes have been successfully treated. In both, streptomycin was no longer effective; the oral administration of INAH was supplemented by 50 mg. of INAH injected into the abscess following weekly aspirations. The collections of pus were much smaller in one month and had disappeared by two months; after six months of treatment this healing has been maintained. Improvement has been obtained and maintained for over six months for a patient with Pott's disease of the dorsal spine. His condition had deteriorated under treatment with streptomycin alone; he could not tolerate PAS. Back pain has been reduced and weight gain will probably make it possible for him to wear a brace which was previously too uncomfortable for use.

Follow-Up

The longest period of follow-up for any case in this series is eight months. Thirty-four patients have been under observation for more than five months. All three clinical relapses occurred within five months after the institution of INAH therapy.

Notes on Results

Rate of Response: In 80 per cent of the improved cases, definite evidence of clinical progress was present within the first month. Only a few patients showed the first signs of improvement after two months. Favorable roentgenographic changes were usually first seen toward the end of the second month of treatment except in a few cases where cavities became smaller after less than a month of INAH therapy. Significant changes in cough, quantity and bacillary content of sputum generally occurred within the first month of treatment.

Most of the patients who took more than one month to show definite signs of improvement suffered from chronic disease. A slow response, however, was also noted in two with acute tuberculous pneumonia. Though these patients felt well, had reduced cough and sputum and gained moderate amounts of weight, they became afebrile only after one and one-half months of treatment and then responded rapidly. Favorable roentgenographic changes were noted in these cases less than two months after the institution of INAH therapy.

Favorable Response in Pulmonary Disease: Definite improvement occurred in 30 out of 36 cases with pulmonary involvement. Favorable changes were most marked in those with acute pneumonic disease or with acute spreads associated with cavities of long standing. Where the clinical and roentgenographic picture had shown little change over a long period, the results were not impressive. Rarely in such cases, marked reduction in the size of a cavity occurred.

Improvement gained by the use of drugs individually or in combination is obviously limited by the amount of destruction scarring and distortion produced by tuberculosis. Other forms of therapy, medical and surgical, must be employed at the appropriate time if the disease is to be arrested in a given case.

Combined Treatment Without Previous Streptomycin and PAS

Combined therapy was always successful wherever streptomycin and/or PAS had not been previously used. Our results indicated no difference in response to combinations of two or three drugs when chemical, laboratory and radiologic data were compared.

All three drugs were used when the patient's state was precarious on admission. In our series, this condition was best typified by the adult patient with tuberculous meningitis who was treated with the three drugs simultaneously and recovered without the intrathecal use of streptomycin.

Use of Hydrazide Alone

Five patients have been treated with INAH alone; three have been followed for more than seven months. Those with long follow-ups have had prolonged treatment with streptomycin and/or PAS which no longer controlled the disease. In two of these individuals, PAS was not tolerated because it produced severe gastric irritation.

The use of INAH alone was unintentional in the remaining two cases. One patient deserted after two months of treatment; spectacular healing of lesions on his soft palate and laryngeal mucous membrane had occurred during his period of hospitalization. The other, after prompt resorption of a pericardial effusion, is about to receive combined treatment with PAS.

INAH Dosage

Forty-four of our patients received a daily dose of 4 mg./Kg. of INAH or IPH. This quantity was effective against all forms of tuberculosis including meningitis.

Six with chronic pulmonary tuberculosis who no longer obtained benefit from streptomycin and PAS were given INAH 8 mg./Kg. daily. All responded to treatment but the rate of response was no faster than for the lower dosage. These patients have been followed for four months without relapse. No adverse drug effects other than hyperactive reflexes have been noted in this group.

INAH vs. IPH

Twelve of the 50 patients received IPH. All with involvement of the serous membranes were treated with IPH and responded definitely within one or two weeks. In the group treated with IPH, the general response appeared to be more rapid when INAH was used. However, the group treated was small and there were individuals with late responses ranging up to two months. A definite decision concerning comparative rates of response to these drugs cannot be made from our data.

Toxicity

Toxic reactions occurred as frequently with INAH as with IPH but the comparative toxicity of the two drugs cannot be judged from so small a series of cases. Hyperactive reflexes were frequently demonstrable but definite muscular twitching occurred in only five cases and caused temporary cessation of treatment in three.

In only one instance was it necessary to stop using the new drug. This patient developed a papular rash and fever on IPH which recurred when the drug was given again. Fortunately, when INAH was substituted for IPH, there was no reaction and therapy continued uneventfully. Other reactions to treatment were few, including constipation, headaches, dizziness and difficulty in urination, the most frequent was constipation. The constipating effect was an advantage to the patient with ileocecal tuberculosis who found that he could control his bowel movements by more frequent, evenly spaced doses early in the course of treatment before a specific effect upon the intestinal lesion had been obtained.

SUMMARY

Fifty patients with various forms of tuberculosis were treated with isoniazid or its isopropyl derivative, for periods ranging up to eight months. With few exceptions, 4 mgm. per kgm. of body weight of either drug was administered daily. After an interval of one to two months in which the early response to the drug was determined, streptomycin or PAS was added to the treatment regimen.

An excellent early systemic response to the drugs was generally noted. In acute pneumonic cases, cough and sputum were sharply reduced and striking resolution was reflected by roentgenograms. A number of more chronic pulmonary cases showed considerable improvement; cough and sputum decreased, and cavities became smaller. Those with serous membrane involvement soon became afebrile and effusions disappeared without repeated aspirations. In meningitis, clinical improvement and favorable

spinal fluid changes occurred. The closure of sinuses leading to bone lesions and the resorption of subcutaneous cold abcesses were observed.

Toxic reactions were mild. In three instances treatment was suspended because of dizziness and muscular twitching but was uneventfully reinstituted. One patient was obliged to discontinue iproniazid because of dermatitis but was able satisfactorily to substitute isoniazid. Increased deep reflexes were noted in most cases.

Because clinical improvement has been maintained in the great majority of cases after the addition of streptomycin or para-aminosalicylic acid, it is suggested that the development of resistant tubercle bacilli (previously demonstrated by others to occur within two months after starting therapy with isoniazid) may be deferred and therapeutic effectiveness prolonged by combined antibiotic therapy.

RESUMEN

Cincuenta casos con formas diversas de tuberculosis, fueron tratados con isoniacida o con su derivado isopropílico, por periodos variables hasta ocho meses. Con pocas excepciones se usó la dosis de 4 mg. por kilo de peso para ambas drogas.

Después de un intervalo de uno a dos meses en el que una inmediata respuesta a la droga se determinó, se agregó estreptomicina y PAS al régimen.

En generali se notó una excelente respuesta a las drogas. En los casos de tuberculosis aguda neumónica, la tos y el esputo se redujeron rápidamente y una notable resolución se reflejó en los roentgenogramas. Cierto número de casos pulmonares crónicos, mostraron considerable mejoría; la tos y el esputo, disminuyeron y las cavidades se hicieron más pequeñas. Los que tenían afección de las membranas serosas, pronto se hicieron afebriles y los derrames desaparecieron sin repetidas aspiraciones. En la meningitis, la mejoría clínica y cambios del líquido cerebroesponal ocurrieron.

En cierre de fístulas conectadas a lesiones óseas y la reabsorción de los abcesos fríos subcutáneos se observaron.

Las reacciones tóxicas, fueron moderadas. En tres casos el tratamiento se suspendió a causa de vértigo y de contracturas musculares, pero el tratamiento pudo reinstituirse sin contra tiempos. En un enfermo, hubo de interrumpirse la isoropilniacida por dermatitis pero se substituyó sin incidentes por la isoniacida. En la mayoría de los casos, se notó aumento de los reflejos profundos.

En vista de que la mejoría fué sostenida en la gran mayoría después de agregar estreptomicina y PAS, se sugiere que el desarrollo de resistencia (antes demostrado en otros, como acaeciendo dentro de dos meses después de indicado el tratamiento con isoniacida), ésta puede ser diferida y la efectividad de la terapéutica puede prolongarse mediante la terapia por la combinación de las drogas.

RESUME

Cinquante malades atteints de formes diverses de tuberculose furent traités par l'isoniazide ou son dérivé isopropyle pendant une période de

huit mois environ. A que lques exceptions près, le produit fut administré quotidiennement à la dose de 4 mmgr. par kilogramme de poids corporel. Après une période d'un ou deux mois qui permit de déterminer inmédiatement les résultats du traitement, on associa la streptomycine ou le P.A.S.

On note généralement des résultats inmédiats excellents. Dans les cas de formes aigues pneumoniques, la toux et l'expectoration furent considérablement réduites, et des régressions frappantes se traduisirent par l'aspect radiologique. Un certain nombre de formes plus chroniques montrèrent une amélioration considérable, avec diminution de la toux et de l'expectoration, et diminution de volume des cavités. Les malades avec atteinte des séreuses, devinrent apyrétiques et les épanchements disparurent sans qu'il soit nécessaire de les ponctionner. Dans la méningite, on remarqua une amélioration clinique et une évolution favorable du liquide cérébro-spinal. On observa la fermeture de fistules partant de lésions osseuses, et la résorbtion d'abcés froids sous-cutanés.

Les réactions toxiques furent faibles. Dans trois cas, on dut interrompre le traitement par suite de vertiges et de crampes musculaires, mais il fut institué de nouveau sans inconvénient. Un malade fut obligé de prendre "l'iproniazide" de façon discontinue par suite de dermatose, mais il supporta d'une façon satisfaisante l'isoniazide. On observa dans la plupart des cas l'exagération des réflexes.

L'amélioration clinique ayant pu être maintenue dans la grande majorité des cas, après association de streptomycine ou de P.A.S., l'auteur pense que l'on recule de cette façon l'apparition de la résistance du bacille tuberculeux (certains auteurs ont prouvé antérieurement qu'elle devait apparaitre dans les deux mois qui suivent l'institution du traitement par l'isoniazide seul). Il pense également que l'on prolonge l'efficacité de la thérapeutique par l'utilisation des antibiotiques combinés.

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The Treatment of Pulmonary Tuberculosis with Isonicotinic Acid Hydrazide*

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Application of isonicotinic acid hydrazide and related compounds under the name Rimifon, Nicotibine, Tizide, Ditubine, was carried out in a total number of 160 cases in the University Clinic of Phthisiology of Athens at the Sanatorium "Sotiria".

The present study concerns only 36 cases of pulmonary tuberculosis of which four had tuberculous laryngitis.

The limited number of 36 selected cases out of 160 is due to the following two important factors, (1) because the duration of the applied therapy is from two and one-half to three and one-half months and, (2) because in these cases the clinical observation as well as the x-ray and the laboratory control were considered as complete.

Most of our patients chosen for this study had far advanced pulmonary tuberculosis and uniformly bad prognosis, e.g. progressive, evolutive, bilateral cavitary tuberculosis, because such is the condition for the most part of patients under treatment at Sotiria.

Besides, we wanted to try the effectiveness of the drug in cases of bad prognosis because the first published data in the Quarterly Bulletin of Seaview Hospital, Vol. XIII, No. 1, January 1952, reported extremely favorable results in such cases.

Here is a summary of the results obtained in these 36 cases:

BEFORE TREATMENT

Sex: all female patients.	
Age: From 19 to 25 years	19
25 to 40 years	14
40 to 45 years	3
Single: 25 — *Married:* 11.	
Duration of Disease Prior to Treatment:	
From 6 to 12 months	3
12 to 24 months	7
24 to 48 months	5
48 to 60 months and over	21
Previous Ineffective Treatment:	
1) Hygiene and bed-rest. Duration:	
From 4 to 8 months	8
Up to 12 months	5
24 months	8
36 months and over	15

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2) Collapse Therapy:
a) Artificial Pneumothorax,
Unilateral 19
Bilateral 3
b) Phrenic crush 6
c) Pneumoperitoneum 2
d) Cavernostomy 3
3) Antibiotic Therapy: Streptomycin,
In 13 cases 20 to 100 gm.
23 cases 100 to 200 gm.
4) Chemotherapy:
a) Para-aminosalicylic acid (PAS),
In 9 cases 500 to 1000 gm.
27 cases 1000 to 3500 gm.
b) Thiosemicarbasone (Conteben),
In 8 cases from 1 gm.,
38 gm. maximum total dosage.

Classification of Cases:
Anatomicopathologically (By Roentgenography) (By Tomography,
Extension,
Unilateral 3
Bilateral 33
Form,
Exudative 4
Productive 8
Exudative-productive (mixed) 24
Cavitary,
Solitary-cavitary 1
Unilateral 15
Bilateral 20
Clinically,
Progressive evolutive 36
intensily in 23; slowly in 12.
Stationary 1

Symptomatology - Semeiology:
Cough,
Slight 22
Intense 12
Excessive intense 1
Expectoration,
Copious 25
Moderate 8
Scanty 3
Temperature,
Subfebrile 4
Fever 8
High fever 24
Toxicity,
Intense 23
Moderate 10
Non-existing 3

Laboratory Findings:
Sputum examination for tubercle bacilli,
Positive 35
Negative 1

Erythrocyte sedimentation rate,
- Rapid 34
- Moderate 2

Urinary findings,
- Hemoglobin slightly positive 1
- 0.20 0/00 of albumin without casts 1
- Traces of albumin 6
- Urobilin slightly positive 2

Blood,
- Increase of white cells from 9,200 to 19,000. 12
- Reduced red blood cells 5
  1st case, 2,560,000; 2nd case, 2,830,000; 3rd case, 2,860,000; 4th case, 3,130,000; 5th case, 3,380,000.

Tests of liver function,
- Turbidity test,
  - Thymol,
    - In 30 cases —
    - In 6 cases +
  - Zinc sulfate,
    - In 12 cases —
    - In 24 cases +
- Floculation test,
  - Thymol,
    - In 3 cases —
    - In 33 cases +
  - Cephalin in all 36 cases +
  - Colloid gold in all 36 cases +

The average daily dosage was 4 mg. per Kg. of body weight. In 3 the dosage was increased from 5 to 7 mgs.

RESULTS OBTAINED DURING AND AFTER TWO AND ONE-HALF TO THREE AND ONE-HALF MONTHS' TREATMENT

Cough and Expectoration:

A temporary rise was observed in many cases at the beginning of the treatment. There was generally observed,
- Was considerably diminished up to the end of the treatment 14
- Was temporarily diminished 5
- Was moderately reduced 17

	Returned to Normal	Considerably Reduced	Slightly Reduced	Stationary
a) In 24 with temperature of 38-40 degrees C.	7	6	6	5
b) In 8 with temperature of 37.4-38 degrees C.	2	0	4	2
c) In 4 with temperature of 36.9-37.4 degrees C.	3	0	0	1

In nine fever reappeared one and one-half months after being reduced.

Appetite,
- Remained stationary 13
- Slightly improved 8

Among the 15:
Ravenousness was observed in 3
Among the 15 the improved:
Appetite remained increased in 14
Was temporary in 9
Weight,
Increased from 1 to 5 Kg. 15
Increased from 5 to 10 Kg. 4
Increased up to 20 Kg. 1
Stationary 13
Reduced from 1½ to 6 Kg. 3

General condition: concerning toxic symptoms as + weakness, fatigue, sweats, depression,

All toxic symptoms reduced or completely disappeared in all patients except two. The amelioration of the general condition in four bedridden patients is extremely satisfactory. They got up and started walking easily enough. In nine among the improved ones, the toxic symptoms reappeared one and one-half months later.

Auscultation,

Considerable decrease in rales and modification of them into dry was observed in two. Relative decrease in rales was observed in 11. The auscultatory examination remained stationary in 20. Deterioration by expansion of rales is observed in three.

The improvement of the general condition, of appetite and temperature was not parallel with the ausculation findings.

Roentgenographic changes (Roentgenograms and Tomograms),

Disappearance or resorption of shades existing around cavities or foci as well as reduction in cavity size is observed in nine; remained stationary in 23; and deteriorated in four.

Laboratory Findings:	Considerably Reduced	Moderately Reduced	Stationary	Increased
Erythrocyte sedimentation rate	6	4	20	3

Sputum examination for tubercle bacilli,

Before treatment the sputum was positive in 35 cases. After treatment the sputum examination was positive in 25, negative in 10 cases.

Culture followed in the 10 negative cases. Here are the given results: negative, four; positive, six. Single sputum-negative case before treatment remained negative.

Blood,

Red blood cells: Four among the five with reduced red cells (2,560,000 to 3,380,000) per cmm. before the treatment, presented during and after treatment a steady increase of 1 to 2 millions. The fifth case remained stationary. In three cases the number of red cells is reduced from 1 to 1½ million, though before the treatment the number was normal.

White blood cells: In 10 among 12 with increased number of leucocytes (over 9,000) before the treatment returned to normal limits, while in two their number remained stationary. Increase of monocytes was observed in six cases. No considerable increase of eosinophils was observed.

Side effects,

Somnolence in two; vertigo in one; dizziness in one; headache in five (extremely severe in one); disturbance of urination in one; increase of reflexes in four; tachycardia in one; excitement in none; constipation in none.

The treatment was not discontinued on account of the above-mentioned side-effects, because they were temporary.

Checking of liver function during and after the treatment.

Turbidity Test:

Thymol,

All 30 cases remained steadily negative after treatment. Among the six positive cases four became negative and two remained positive after treatment.

Zinc sulfate,

Twelve remained steadily negative after treatment. Among the 24 positive cases 16 remained positive and eight became negative.

Flocculation Test:

Thymol,

All three negative cases remained negative after treatment. Among the 33 positive cases 23 remained positive and 10 became negative as before.

Cephalin,

Among the 36 positive cases, 30 remained positive and six became negative.

Colloidal, gold,

Among the 36 positive cases, 28 remained positive and eight became negative.

An adequate proportion of cases with positive liver function tests before treatment, later became negative. From this fact we have come to the conclusion that, thanks to the improvement made by the new therapy, the liver rid itself of the toxicity.

On the other hand, the cases with negative liver function tests remained steadily negative after the treatment. Consequently the new drugs do not overcharge the function of liver.

Urine examination: In a single case the protein increased from 0.20 0/00 to 1 Gm.

Relapse:

Nine patients presenting clinical improvement relapsed after one to two months treatment, and all the toxic symptoms reappeared. Among the relapsed cases the focal lesion was deteriorated in one, and remained stationary in eight. There are two possible explanations for the reappearance of the toxic symptoms, (a) that the effectiveness of the therapy was no longer sufficient and b) that the tubercle bacilli acquired resistance to these drugs.

In 1, death occurred on the 46th day of treatment
In 1, death occurred on the 47th day of treatment
In 1, death occurred on the 57th day of treatment
In 1, death occurred on the 96th day of treatment.

SUMMARY

1) Serious toxic reactions have not been seen by the use of these new drugs in a dosage of 4 to 5 mg. per Kg. of body weight.

2) With the administration of these compounds no clinical unfavorable influence was observed.

3) The temperature, the toxic symptoms, as appetite, fatigues, sweats as well as the general condition of the patients were favorably influenced from the first days of treatment.

4) The more elevated the temperature the more favorably it is influenced.

So, within three to six days the temperature fell by crisis to normal limits or remained at a lower degree, while slight fever was hardly influenced.

5) It was impressive how appetite was regained, reaching in certain cases the limits of ravenousness.

6) We have been impressed by the fact that patients of bad prognosis confined permanently to bed on account of their severe toxic condition got out of bed and strolled around the clinic.

7) Intense cough was greatly influenced. The incessant cough of one patient not influenced by the common drugs, gradually diminished and finally disappeared.

8) Expectoration decreased in half of our cases. It is interesting to notice that, the more copious the sputum previously was, the more reduced it became.

9) Unfortunately amelioration in the general condition and symptoms of the patients was not followed by adequate improvement in the auscultatory findings except in two cases.

10) Satisfactory x-ray film modification was not observed. In nine cases it consisted of considerable reduction or complete disappearance of the pericavitary and perifocal shadows. The foci themselves were not influenced. In a few cases only the existing cavities became smaller. In certain cases roentgenograms taken after the treatment showed disappearance of preexisting cavities. But tomography taken afterwards demonstrated that cavities existed as before.

11) It is interesting to note that in nine cases despite the clinical amelioration after a one and one-half to two months treatment, a relapse occurred and consequently all the toxic symptoms reappeared. In eight of these cases the focal process remained stationary and in one, deteriorated. Consequently, in a certain number of cases, the administration of the new drugs did not manage to stop the further evolution of the disease despite the temporary amelioration: four of these nine patients died. Intense toxic symptoms in certain cases were considerably diminished.

In case of primary infection, the new drugs must be administered with the maximum dosage daily (4-5-7-10 mg. per Kg. body weight) for one to three months, until the morbid symptoms disappear. Afterwards, the administration of streptomycin must follow (three times a week) in a total quantity of 15-20-30-40-50 Gm. while simultaneously PAS is given per os, long after streptomycin is discontinued.

In case of chronic tuberculosis associated with intense toxic symptoms, the hydrazides must be administered in order to reduce or make the toxic symptoms disappear. On the other hand, the administration of the new drugs in cases of chronic tuberculosis without toxic symptoms is useless.

When collapse therapy in certain cases of chronic tuberculosis is indicated, it should not be postponed or replaced by the new drugs. We do not know yet whether the administration of 10 mg. per Kg. of body weight per day instead of 4 to 5 mg. of isonicotinic acid hydrazide might give us better results, especially in focal processes.

RESUMEN

1) No se han visto reacciones tóxicas de seriedad, usando esta nueva droga a las dosis de 4 a 5 miligramos por kilo de peso.

2) No se observó con el uso de las mismas, ninguna influencia clínica desfavorable.

3) La temperatura, los síntomas tóxicos, tales como el apetito disminuído, los sudores y la fatiga, así como el estado general, fueron favorablemente influenciados desde los primeros días del tratamiento.

4) Mientras más elevada es la temperatura, mayor es la influencia favorable. Así, dentro de los tres a seis primeros días, la temperatura descendió por crisis a los límites normales o permaneció en grados menores, en tanto que cuando la fiebre era ligera apenas era modificada.

5) Fué impresionante notar como el apetito se recobró llegando en ciertos casos a ser voraz.

6) Nos impresionó también, el hecho de los enfermos con mal pronóstico confinados de manera permanente en la cama a causa de sus condiciones de severa toxicidad, abandonaron la cama y deambularon por la clínica.

7) La tos intensa fué grandemente influenciada. La tos incesante de un enfermo que no había sido modificada por medio de las drogas comunes, gradualmente disminuyó y finalmente desapareció.

8) La expectoración decreció en la mitad de nuestros casos. Es interesante notar que mientras más copioso era el esputo antes, más se reducía después.

9) Desafortunadamente la mejoría no fué seguida de cambios correlativos a la auscultación, salvo en dos casos.

10) No se observó modificación satisfactoria en las películas de rayos X. En nueve casos consistió en considerable reducción o completa desaparición de las sombras pericavitarias y perifocales. Los focos mismos no fueron modificados. En pocos casos solamente las cavidades roentgenogramas tomados después del tratamiento mostraron completa desaparición de las cavidades pre-existentes.

11) Es interesante notar que en nueve casos a pesar de la mejoría clínica después de uno y uno y medio o dos meses, una recaída ocurrió y todos los síntomas tóxicos reaparecieron. En ocho de estos casos, la infiltración focal, permaneció estacionaria y en uno empeoró. En consecuencia, en cierto número de casos la administración de la droga no logró detener la evolución ulterior de la enfermedad a pesar de la mejoría temporal.

RESUME

1) On n'a enregistré aucune réaction toxique avec ces nouvelles drogues à la dose de 4 à 5 mmgr. par kilogramme de poids corporel.

2) Aucune influence clinique défavorable ne fut observée après administration de ces produits.

3) La température, les symptômes toxiques, tels que l'appétit, la fatigue, les sueurs, aussi bien que l'état général du malade, se sont trouvés favorablement influencés depuis les premiers jours du traitement.

4) Plus la température est élevée, plus elle est favorablement influencée. Ainsi, après trois à six jours, la température tombe en crise jusqu'à la normale, ou bien reste à un degré assez bas, tandis que les fièvres légères sont à peine influencées.

5) Il est impressionnant de noter combien l'appétté est stimulé, atteignant dans certains cas les frontières de la boulimie.

6) Nous avons été frappés par le fait que les malades pour lesquels le pronostic était sombre, et qui étaient confinés au lit à cause de la gravité de leur intoxication, ont pu quitter leur lit, et se promener autour de la clinique.

7) La toux fut grandement influencée. C'est ainsi que pour un de nos malades, sa toux incoercible qui n'avait pas été modifiée par les traitements habituels diminua progressivement et finalement disparut.

8) Dans la moitié de nos cas, l'expectoration diminua. Il est intéressant de noter que plus elle était abondante auparavant, plus elle fut réduite ensuite.

9) Malheureusement, l'amélioration ne fut pas corroborée par les signes d'auscultation sauf dans deux cas.

10) On n'observa pas de modifications radiographiques satisfaisantes. Dans 9 cas, elles consistaient dans la réduction considérable et la complète disparition des ombres péricavitaires et périfocales. Les foyers eux-mêmes n'étaient plus influencés. Dans quelques cas seulement, les cavités se rétrécirent. Dans certains cas, des clichés pris après le traitement montrèrent la dispartion des cavités antérieures. Mais les tomographies faites ensuite montrèrent l'existence de cavités, comme auparavant.

11) Il est intéressant de noter que dans 9 cas, en dépit de l'amélioration clinique après un mois et demi ou deux mois de traitement, une rechute apparut accompagnée de tous les symptômes toxiques. Dans huit de ces cas, le processus resta inchangé, et dans un cas fut remanie. Par contre, dans un certain nombre de cas, l'administration des nouveaux produits ne réussit pas à arrêter l'évolution ultérieure de la maladie, malgré une amélioration momentanée.

Trachiectasis with Tracheocele: Report of Case in Which a Tracheocele was Resected

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Trachiectasis is characterized by dilatation of the trachea and by multiple small herniations of the membranous portion of the trachea. It has also been called tracheal or bronchial diverticulosis,[1] multiple diverticula[2] of the trachea, or generalized softening of the tracheobronchial system (tracheomalacia).[3] On rare occasions, this condition has been associated with the formation of a tracheocele, which has sometimes been referred to as a tracheal diverticulum, bronchocele, aerocele or air cyst. A tracheocele may be present without associated trachiectasis.

Ziegelman[4] and Drymalski, Thompson and Sweany[5] reviewed the literature concerning tracheal diverticula and presented excellent summaries of the subject. They said that this condition was described and clearly distinguished from goiter as early as the seventeenth century. Most instances of this condition have been found at necropsy. Morlock and Pinchin[1] and Nielsen[2] reported cases similar to the one which we shall report, in which the diagnosis was established by bronchography. Addington, Rusk and Cohen[6] reported a case of tracheocele in 1944. Their photographs also demonstrated the condition we are calling trachiectasis, but they did not comment on this.

Report of Case

A male retail sales clerk, 52 years of age, came to the Mayo Clinic on November 3, 1951, complaining of a cough productive of large amounts of purulent sputum. During World War I he had noted the gradual onset of this difficulty, and since that time there had been little change in symptoms. The most troublesome feature had been the frequent sudden paroxysms of coughing which often occurred while he had been helping a customer. At these times, it had been necessary for him to excuse himself in order to expectorate large amounts of purulent sputum. In addition to this, approximately one to four times yearly he had experienced episodes of chills followed by an increase in his temperature to 101 or 102 degrees F., which lasted two or three days.

Physical examination did not disclose any abnormality. The otolaryngologist reported no evidence of disease in the accessory nasal sinuses. A roentgenogram of the thorax (Figure 1) was interpreted as showing a peculiar cystic structure adjacent to the left side of the superior portion of the mediastinum. At the time of bronchoscopic examination the trachea was found to be dilated, and an opening approximately 1 cm. in diameter was seen in the left posterolateral wall about 5 cm. below the vocal cords. Bronchograms demonstrated trachiectasis with multiple small diverticula (Figure 2). At the level of the clavicles on the left there was a large tracheal diverticulum or tracheocele, which measured about 8 cm. in

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length and 3 cm. in its brodest diameter (Figure 3). The ectasia extended into some of the major bronchi, but otherwise no bronchiectasis was present. Cultures of the sputum produced Klebsiella in addition to the usual flora.

In an attempt to avoid future attacks of pneumonia and abscess of the lung due to aspiration, one of us (Clagett) resected the tracheocele on November 20, 1951, by splitting the sternum and approaching the tracheocele through the anterior mediastinum. The diverticulum projected from the left posterolateral wall at the junction of the cartilaginous and membranous portions of the trachea. Following resection of the tracheocele and closure of the wound, a tracheotomy was performed just below the isthmus of the thyroid, and a tube was inserted into the trachea to reduce the intratracheal pressure during the postoperative period. Convalescence was uneventful. Aerosol penicillin and streptomycin were administered for a few days preoperatively, and during hospitalization postoperatively. The tracheotomy tube was removed on the seventh postoperative day. The patient was dismissed from our care on December 5, 1951, with instructions to drain his trachea by postural methods three or four times daily and to use one of the antibiotics, such as aureomycin, terramycin, or aerosol penicillin, and streptomycin intermittently.

Comment

Bland-Sutton[7] said that the emu (Dromeus novehollandie) has a normal tracheocele with the defect in the anterior wall of the trachea. The adult emu inflates this sac when it produces the peculiar booming sound which resembles the noise made by blowing across the mouth of a large bottle. The sac may become inflamed and distended with mucus. In one such instance, the animal, unfortunately, drowned from aspiration of this material while Bland-Sutton was attempting to evacuate the contents.

In the case which we have reported, it was our opinion that the tracheocele was capable of retaining a large amount of purulent secretion, which spilled into the trachea, causing the patient to experience paroxysms

FIGURE 1: Roentgenogram of the thorax, showing cystlike structure containing air in the superior mediastinum on the left at the level of the clavicles.

of coughing during waking hours. Transient attacks of pneumonia due to aspiration of this material into the lungs, especially during sleep, probably accounted for the recurrent attacks of chills and fever which the patient experienced. Resection of the tracheocele was, therefore, a justifiable and warranted procedure. Ziegelman,[4] in reporting a case in which this condition was found at necropsy, recommended this treatment, and Arce[5] resected a diverticulum of the right primary bronchus.

Trachiectasis, although reported very infrequently in the medical literature, may not be as uncommon as is believed. In a brief review of 200 recent bronchograms made at the clinic, this condition was encountered in one other case. In this instance, there was also a diffuse saccular type of bronchiectasis. The patient was a man, 30 years of age, who complained of frequent colds and attacks of pneumonia over a period of five years. Cultures of his sputum grew the usual flora and a Streptococcus of the green-producing species.

The cause of these conditions is unknown, but in the instances reported the development of symptoms (during adult life) leads one to believe that they are acquired and not congenital. Stibbe[9] expressed the opinion that those diverticula with wide openings are acquired, whereas those with narrow, pin-point openings or pedicles are congenital. He said that the critical pathologic feature is destruction of the elastic tissue as in bronchiectasis.

SUMMARY

A patient with a chronic cough productive of purulent sputum, with sudden paroxysms of coughing and recurrent episodes of chills and fever was found to have trachiectasis with a tracheocele. The tracheocele was

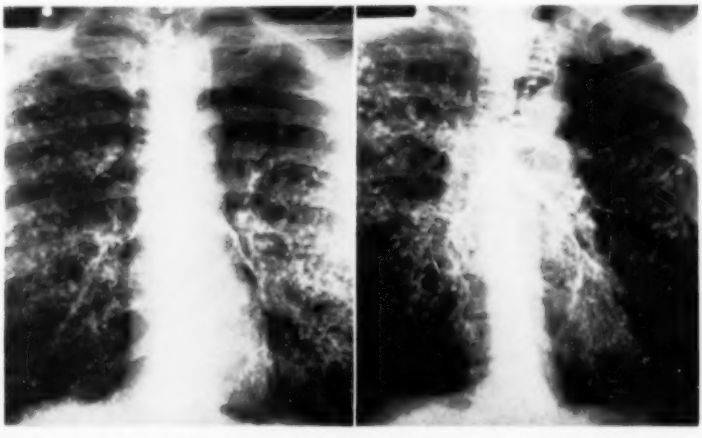

FIGURE 2: Bilateral bronchograms (antero-posterior and left oblique views) showing the fluid level in the large diverticulum to the left of the trachea, dilatation and displacement of the trachea, and multiple tiny sacculations extending into the major bronchi.

FIGURE 3A FIGURE 3B FIGURE 3C

Figure 3: **A.** Filling of large diverticulum with iodized oil through the bronchoscope, which is in the trachea; **B** and **C**, antero-posterior and lateral roentgenograms of the thorax in upright position made after filling of the tracheocele and demonstrating two fluid levels and the left posterolateral position of the tracheocele.

resected to eliminate "dumping" of purulent secretion into the tracheobronchial tree.

RESUMEN

Un enfermo tenía tos productiva crónica con esputo purulento repentinos paroxismos de tos y episodios recurrentes de calosfríos y fiebre. Se encontró que tenía traquiectasia con traqueocele. El traqueocele fué resecado para eliminar la acumulación de secreciones en el arbol traqueobrónquico.

RESUME

Un malade atteint d'une toux chronique avec expectoration de crachats purulents, accompagnée de paroxysmes soudains de toux et d'épisodes de température avec frissons a été trouvé porteur d'une trachiectasie avec trachéocèle. Le trachéocèle a été réséqué afin d'éviter l'inondation de l'arbre bronchique par des sécrétions purulentes.

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Fibro-Anthracosis of the Lungs in Elderly Individuals in a Smoky City*

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The role of the various components of dusts and smoke in the production of fibrotic lesions of the lung has not been completely clarified.[1-3] The possibility of lung damage from long continued exposure to an industrial, smoky atmosphere has not been ruled out by an adequate study of the pathologic changes in the lungs of long time, elderly residents of a smoky city. Pittsburgh, until the advent of its smoke control program in 1947, was for many years an outstanding example of a smoky city. The combination of the heavy smoke from industrial plants, the use of soft coal in heating, and the frequent occurrence of fog from the rivers has resulted in years past in a dense, smoke filled atmosphere popularly described as smog.

During a recent analysis of the causes of death in a consecutive series of 770 autopsies at the Pittsburgh City Homes and Hospital at Mayview, Pennsylvania, from 1934 to 1941, I encountered what seemed to be a high incidence of fibro-anthracosis of the lungs. The term fibro-anthracosis was used in this series to mean definite gross fibrosis of the lung in addition to anthracotic discoloration. Since all of the patients in this institution were necessarily residents of the City of Pittsburgh prior to admission, I felt that this should be an ideal group in which to determine the role of smoke in the production of lung fibrosis. Accordingly, the entire series was reviewed to determine whether the fibro-anthracosis present was a result of exposure to the smoky atmosphere or to direct occupational exposure to dust. This study deals only with possible fibrotic damage to the lung from smoke and is not concerned with possible acute, toxic effects from certain types of smoke or the relative etiologic importance of the silica and carbon components of the smoke in the production of the fibrosis.

Material

The autopsy material at the Pittsburgh City Homes and Hospital was made up of indigent residents of the City of Pittsburgh admitted to the general hospital, the hospital for mental cases, or the home department. The last group included relatively few patients as the home department had been almost entirely eliminated prior to the time of the series. The average age of the subjects at autopsy was 60 years. Male patients predominated by a ratio of slightly less than 3 to 1 (568 to 202). In an evaluation of lung damage from dust and smoke in this group, the fact that coal mining is a large, essential industry in this area must be considered.

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Only the latest occupation was listed in the patients' histories in most instances, and many of the male patients recorded as laborers had worked in the coal mines at some time in their lives.

Results

Review of the autopsy records revealed that 97 of the 770 subjects in the series showed some degree of fibro-anthracosis, an incidence of 12.5 per cent. At least slight anthracotic discoloration of the lungs was present in almost every autopsy, but only those subjects showing gross scarring as well as anthracotic deposition were included in this report. Microscopic examination of the lungs of the 97 subjects with gross fibro-anthracosis revealed marked proliferation of macrophages and fibrosis of varying degree. The fibrous tissue reaction did not show the usual silicotic response of regular, ovoid, laminated nodules. Rather, the fibrous tissue was arranged in bundles, fine strands or streaks, or poorly formed whorls in an irregular network with the large phagocytic cells containing carbon particles. Giant cell reaction and necrosis were not seen unless tuberculosis or definite silicotic nodules were present. Only two instances of clear cut silicosis were found in the 770 autopsies. Both of these occurred in stone workers, and the silicosis was not the principal cause of death in either case.

Of the 97 subjects with fibro-anthracosis, 90 were male and seven were female. In eight instances fibro-anthracosis was listed as the principal cause of death, a fatal incidence of 1.0 per cent in the entire series. In two additional instances it was a contributory cause of death in patients with tuberculosis of the lungs. Of the subjects in whom fibro-anthracosis was listed as the principal cause of death, six showed no other pathologic changes of consequence. The 10 patients in whom the fibro-anthracosis was the primary cause of death or contributed to death were male. Six of these 10 men listed their occupation as "coal miner" with periods ranging from four years to 33 years in the coal mines. One gave his occupation as

TABLE I

Severity of Fibro-anthracosis Related to Sex, Age, and Occupation.

Degree of Severity	No. of Cases	Sex	Average Age	Occupation
3+	11	all males	65.9	6 miners, 1 laborer, 1 carpenter, 1 painter, 2 not listed.
2+	24	all males	65.3	1 miner, 13 laborers, 1 farmer, 1 steel worker, 1 shoemaker, 7 not listed.
1+	62	7 females	73.7	All housewives or domestics.
		55 males	65.7	Chiefly laborers, steel mill and railroad.

"painter," one as "laborer," and two did not list occupations. The ages of these men were 50, 54, 55, 57, 67, 68, 69, 71, 73, and 78 with an average age of 64.2 years.

The degree of severity of gross involvement of the lungs in this series was graded as 1+, 2+, or 3+. Those lungs listed as having 1+ damage showed only minimal scarring, usually apical and occasionally unilateral. Those lungs with 2+ damage showed more widespread scarring usually involving all lobes and always bilateral but not extensive enough to result in any considerable degree of respiratory impairment. Those lungs listed as having 3+ damage showed extensive, bilateral scarring involving all lobes of the lungs. The most severe damage in all three groups occurred at the apices of the lungs. The figures showing the number of individuals in each group, their sex, average ages, and occupations are listed in Table I.

The mechanism of death in the 10 fatal instances of fibro-anthracosis was congestive heart failure. In the six cases where no other pathologic lesion was found at autopsy, there was hypertrophy of the right side of the heart, especially of the right ventricle. Marked hypertrophy of the left ventricle was not observed in any of this group. The average weight of these six hearts was 380 gms. Of the other four instances in which fibro-anthracosis caused or contributed to death, marked hypertrophy of the right ventricle was found in one, and there was slight general enlargement of the heart in two others. The duration of symptoms in the fatal cases varied from one to 37 years. The outstanding symptoms listed were shortness of breath, cough, cyanosis, pain in the chest, and edema of the ankles.

Analysis of the causes of death in those cases in which death was not due to fibro-anthracosis showed a distribution identical to the causes of death in the entire series. Cancer, arteriosclerotic heart disease, and tuberculosis accounted for most of the deaths. Tuberculosis was the principal cause of death in two instances, where the fibro-anthracosis was the contributory cause, and in eight instances where the fibro-anthracosis was not related to the death. This represents an incidence of 10.3 per cent of deaths from tuberculosis in the fibro-anthracotic group as compared to an over al incidence of death from tuberculosis in the 770 autopsies of 12.6 per cent. Minimal obsolete tuberculosis was found in many additional instances in the fibro-anthracotic lungs but no more frequently than in the rest of the autopsy series. Cancer of the lung was found twice in these 97 patients compared to eight times in the remaining 673.

Only two of the 97 patients died from lobar pneumonia and two from bronchopneumonia, a fatal incidence from each of 2.1 per cent. This compares with a fatal incidence of 4.5 per cent from lobar pneumonia and 4.2 per cent from bronchopneumonia in the entire series of 770 subjects. These figures do not include instances where pneumonia was present but was not the principal cause of death. This relatively low incidence of death from pneumonia in patients with fibro-anthracosis is in conflict with the conclusions of Schnurer,[3] who reported that the pneumonia case and death rates in the Pittsburgh district increased in direct proportion to the degree of pneumoconiosis. However, our figures confirm the opinions of Haythorn

and Meller,[4] who reported that there was no actual increase in death rate from pneumonia in fibro-anthracotic subjects in the Pittsburgh district when age factors were taken into consideration.

Discussion

Analysis of this series of 770 autopsies with 97 instances of fibro-anthracosis of the lungs shows that the incidence of this disease is directly related to occupational exposure to high concentrations of dust. The marked difference in sex ratio with only seven females of 202 in the series showing any degree of fibro-anthracosis and the minimal lung damage in these seven women indicates that exposure to a smoky atmosphere such as that in Pittsburgh prior to smoke control, even over long periods of time, does not result in any appreciable degree of lung fibrosis. The marked preponderance of coal miners in the fatal instances of fibro-anthracosis of the lungs in males supports this viewpoint.

The average age of the seven females (all showing 1+ lung damage) was 73.7 years. The average age of the men with 1+ damage was 65.7 years; the average age of the men with 2+ damage was 65.3 years; and the average age of the men with 3+ damage was 65.9 years. All of these average ages are higher than the average age for the entire series of autopsies (60 years), so that the fibro-anthracosis apparently did not predispose to death from other causes and did not shorten the life expectancy of the group, except when it actually caused death.

SUMMARY

Study of a series of 770 consecutive autopsies on elderly individuals with an average age of 60 years from the City of Pittsburgh shows an autopsy incidence of some degree of fibro-anthracosis in 97 subjects or 12.6 per cent. In six instances fibro-anthracosis was the sole cause of death and in two other instances the principal cause of death, a fatal incidence of 1.0 per cent. In two additional instances fibro-anthracosis was listed as a contributory cause of death. Analysis of the causes of death in the 97 subjects with fibro-anthracosis indicates that the presence of fibro-anthracosis in the lungs does not increase the incidence of or predispose to death from other lung diseases such as pneumonia, tuberculosis, and bronchogenic carcinoma.

Fibro-anthracosis was found in only seven females, and in each of the seven women lung damage was slight and had no effect on the patient's death. Most of the fatal cases of fibro-anthracosis occurred in coal miners. The mechanism of death was congestive heart failure. Right ventricular hypertrophy was marked in almost all of the fatal examples.

Study of this group of 770 residents of the City of Pittsburgh with an average age at autopsy of 60 years suggests that long continued exposure to a smoky atmosphere, while it may cause minimal scarring after many years, does not result in any appreciable degree of lung fibrosis. Fibro-anthracosis of the lungs, in the Pittsburgh district at least, is an occupational disease, predominantly if not entirely associated with coal mining.

RESUMEN

El estudio de 770 autopsias consecutivas en individuos de edad senil con un término medio de 60 años, realizado en la Ciudad de Pittsburg muestra una incidencia a la autopsia de cierto grado de fibroantracosis en 97 personas o sea 12.6 por ciento.

En seis casos la fibroantracosis fué la causa única de la muerte y en otros dos la causa principal. La incidencia fatal fué de 1.0 por ciento. En dos casos mas la fibroantracosis fué considerada como causa contribuyente de la muerte.

El análisis de las causas de la muerte en 97 sujetos con fibroantracosis indica que ésta no aumenta la frecuencia de, o predispone a la muerte por otras enfermedades pulmonares tales como la neumonia la tuberculosis y el carcinoma bronquigénico.

La fibroantracosis fué encoentrada solo en siete mujeres y en todas ellas el daño fué ligero y no tuvo influencia en el, fallecimiento de las enfermas. La mayoria de los casos letales de fibroantracosis ocurrieron en mineros de carbón. El mecanismo de la muerte fué la insuficiencia cardiaca congestiva. En casi todos los casos fatales la hipertrofia ventricular izquierda fué marcada.

El estudio de 770 residentes de Pittsburg con una edad media a la autopsia de 60 años sugiere que la exposición continua a una atmósfera cargada de humo, si bien puede causar cicatrices mínimas después de muchos años, no resulta en un apreciable grado de fibrosis pulmonar.

La fibroantracosis del pulmón, por lo menos en el distrito de Pittsburg, es una enfermedad ocupacional, predominantemente si no completamente, asociada al trabajo de las minas de carbón.

RESUME

Une étude de 770 autopsies consécutives chez des individus assez âges (âge moyen de 60 ans) provenant de la ville de Pittsbourg, a montré un certain degré de fibro-anthracose chez 97 d'entre eux, soit dans 12.6% de cas. Dans six cas, la fibro-anthracose semblait la seule origine de la mort, et dans deux autre cas la cause principale. Dans deux autres cas, la fibro-anthracose ne pouvait être considérée que comme une cause accessoire. L'analyse des causes de la mort de 97 sujets atteints de fibro-anthracose montre que la présence de ces altérations dans les poumons n'augmente pas la fréquence des décès, ou ne prédispose pas à la mort par l'intermédiaire d'autres maladies, telles que pneumonie, tuberculose ou cancer.

On trouva des lésions de fibro-anthracose chez sept femmes seulement, et dans chacun de ces cas, les lésions pulmonaires étaient légères, et n'eurent pas d'incidence sur la mort. La plupart des cas mortels de fibro-anthracose de montrèreut chez des mineurs. Le mécanisme de la mort fut e'insuffisance cardiaque. L'hypertrophie ventriculaire droite était accentuée fut e'insufficance à peu près tous les cas mortels.

L'étude de ce groupe de 770 habitants de la ville de Pittsbourg de l'âge moyen de 60 ans lors de leur autopsie montre qu'une exposition longtemps

continue dans une atmosphère de fumée peut sans doute causer de très légères lésions après de nombreuses années, mais ne constitue pas un degré notable de fibrose pulmonaire. La fibro-anthracose des poumons, tout au moins dans le district de Pittsbourg, est une maladie professionnelle nettement prédominante chez les mineurs de charbon, et peut-être même uniquement chez eux.

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Spontaneous Pneumothorax*

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This study is a review of 84 cases of spontaneous pneumothorax seen in three general hospitals in the Los Angeles area. All cases were considered with the following points in mind: previous pulmonary history; causative pathology; activity at onset; symptoms; percentage of collapse; presence of effusion or blood; method of treatment; time required for re-expansion; mortality; and follow-up. Table I shows the various types of pulmonary disease that the patients had had. Forty-two (50 per cent) had no previous pulmonary history. Fourteen (17 per cent) of all the cases, had had one or more previous spontaneous pneumothoraces. In the great majority of cases, the cause was unknown. Table II shows the various proved causes of some of the cases. Ruptured bleb accounted for 16 in which blebs were proved to be present. In the case of the shell fragment eroding the lung, one might suspect that trauma was the cause, but it is doubtful because this fragment had been present for four years before the lung collapsed. The pneumothorax which occurred following thyroidectomy might be accredited to trauma.

At no time was the superior mediastinum entered during the operation, and the surgeon's report definitely stated that the pleura had not been entered at the time of surgery. A rare cause of spontaneous pneumothorax is the Hand-Schuller-Christian Syndrome. This particular case was authenticated by lung biopsy.

Strenuous activity has been considered a precursor to spontaneous pneumothorax. Only two of our cases had onset during such activities (Table III). Normal activities consisted of actions that are carried out in every-day life, which include coughing, sneezing, and normal movements incident to occupation. Several spontaneous pneumothoraces occurred while the patients were asleep.

Table IV lists the various symptoms which were encountered. Most of the patients had more than one symptom, and almost all of them experienced pain and dyspnea. Of singular importance is that all patients had some symptoms and because these are always present, the diagnosis should be readily suspected and easily made.

All degrees of collapse were encountered. Table V shows the amount of collapse. The exact percentage of collapse could not be accurately estimated, and most estimations were made from the x-ray films which were available in all cases. A similar difficulty was encountered in estimating the amount of fluid or blood present. Table VI depicts these estimates. There were only three hemo-pneumothoraces in this series.

A wide variety of surgical and non-surgical treatment was used. The

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majority of patients, 45 in all, were treated by bed rest alone. The others had a number of combinations of treatment, which are listed in Table VII. Table VIII, which shows the time required for full expansion, teaches the most important lesson that can be learned from this study. When bed rest alone was used, an average of 34 days was required for complete re-

TABLE I: PREVIOUS PULMONARY HISTORY

None	42	
Previous Spontaneous Pneumothorax	14	
Tuberculosis	8	
Asthma	6	
Chronic Bronchitis	10	
Pneumonia	5	
Emphysema	4	
Pleurisy	2	
Fatigue	1	
Shell Fragment (four years previous)	1	
TOTAL		93

Eight patients had more than one of above.

TABLE II: CAUSATIVE PATHOLOGY

Unknown	51	
Ruptured Bleb	61	
Tuberculosis	8	
Emphysema	2	
Pneumonia	3	
Bronchogenic Carcinoma	1	
Shell Fragment Eroding Lung	1	
Following Thyroidectomy	1	
Hand-Schuller-Christian Syndrome	1	
TOTAL		84

TABLE III: ACTIVITY AT ONSET

Normal Activities	82	
Lifting Cement Sack	1	
Playing Volley Ball	1	
TOTAL		84

TABLE IV: SYMPTOMS

Pain	71
Dyspnoea	64
Cough	7
Cyanosis	2
Hoarseness	1
Fever	1
Headache	1
Coma	1
Wheeze	1
Shock	1
Numbness: Arm	1
No Symptoms	0

expansion. When aspiration was used, 22 days were required for complete re-expansion. When needle plus water-sealed bottle was used, 29 days were required for complete re-expansion. When a catheter plus water-seal was used, an average of three days was required. Regardless of the method of treatment, there were no empyemas in this series.

There were five deaths. The various causes are listed in Table IX. Of the five deaths, only three were caused by the spontaneous pneumothorax. In these three cases none was treated for the pneumothorax. In each instance, the cause of death was tension-pneumothorax which was subsequently proved at autopsy. Two of the cases were in older men who were admitted to the hospital for urologic treatment. In each instance, a ruptured bleb was responsible. The third case was in a girl of 12 years, who

TABLE V: PERCENTAGE OF COLLAPSE

100 per cent	27	
90 per cent	13	
80 per cent	2	
70 per cent	8	
60 per cent	4	
50 per cent	10	
40 per cent	4	
30 per cent	7	
20 per cent	1	
10 per cent	5	
Unknown	3	
TOTAL		84

TABLE VI: PRESENCE OF EFFUSION OR BLOOD

None	53	
Effusion: Slight	15	
Moderate	13	
Blood: Moderate	1	
Marked	2	
TOTAL		84

TABLE VII: TREATMENT

Bed Rest (one had intrapleural blood injected)	45	
Air Aspirated: Multiple	9	
Single	7	
Multiple Aspirations and Water Seal Drainage	4	
Water Seal Alone	6	
Excision of Bleb or Cyst	5	
Multiple Aspiration and Decortication	3	
Water Seal Drainage and Excision of Cyst	1	
Multiple Aspirations and Closed Lysis	1	
Decortication and Excision of Cysts	1	
Multiple Aspirations and Water Seal Drainage and Excision of Blebs	1	
Removal of Shell Fragment	1	
TOTAL		84

had pneumonia on the side opposite the pneumothorax. Because of the dense consolidation on one side and the collapsed lung on the other, the child died from anoxia. The remaining two cases died from other disease. One had congestive heart failure and pneumothorax which was expanding at the time of death. The other had far-advanced terminal tuberculosis.

The follow-up in this series is rather poor. What little follow-up is available is shown in Table X. Five recurrences of the pneumothorax are noted. Only two of the cases subsequently developed tuberculosis.

From our studies on these cases, it is our opinion that spontaneous pneumothorax is best treated by an intrathoracic catheter with water-sealed drainage when there is 50 per cent or more collapse and when there is

TABLE VIII: TIME REQUIRED FOR FULL EXPANSION

Bed Rest		
Longest	90 days	
Shortest (Newborn)	4 days	
Average		34 days
Aspiration		
Longest	40 days	
Shortest	2 days	
Average		22 days
Needle Plus Water Seal		
Longest	60 days	
Shortest	3 days	
Average		29 days
Catheter Plus Water Seal		
Longest	6 days	
Shortest	Immed.	
Average		3 days

No Empyema in Series.

TABLE IX: MORTALITY

Emphysema and Multiple Blebs (ages 60 and 62)	2	No Treatment
Pneumonia in Opposite Lung (age 12)	1	No Treatment
Congestive Heart Failure (age 62—pneumothorax expanding at death)	1	Aspirated
Advanced Bilateral Tuberculosis	1	Water-Seal
TOTAL		5

TABLE X: FOLLOW-UP

Not Followed	49	
No Recurrence (2 to 48 months)	20	
One Recurrence (3 to 6 months)	3	
Multiple Recurrences (6 to 22 months)	2	
Died (Pneumothorax)	3	
(Other Disease)	3	
Developed Other Pulmonary Disease		
(Pneumonia)	2	
(Tuberculosis)	2	
TOTAL		84

evidence of persistent pleural leak. Pleural leak is determined by aspirating the pleural space with a pneumothorax machine, taking intrapleural pressures before and after aspiration. If the negative intrathoracic pressure is not maintained, a pleural leak is present.

We agree with Hughes and his associates,[1] and we use a method of drainage similar to the one they have described. The equipment required and the technique of inserting the catheter are extremely simple. Any physician can introduce the catheter without difficulty. The only necessary equipment is contained in an ordinary abdominal paracentesis set, which all hospitals have available (Figure 1). It includes a trocar and cannula; scissors; a syringe and needles; a scalpel; a tissue forceps; two small mosquito forceps; medicine glass; a needle holder; a needle; fine silk suture; and a few sponges. Under local procaine anesthesia, the skin, subcutaneous tissue and muscle are infiltrated down to and including the parietal pleura. Incision is made over the second or third intercostal space, anteriorly, in mid-clavicular line. The incision need be only long enough to accomodate the trocar and cannula. The trocar is then plunged through into the pleural space and the catheter passed through the cannula into the pleural space. The cannula is withdrawn, and a small silk suture is placed in the skin and tied around the catheter. The catheter is then attached to a water-sealed bottle (Figure 2). Water-sealed drainage is advocated because re-expansion promptly follows the establishment of negative intrathoracic pressure. An average of three days is required to re-expand the lung when this method is used. Thirty-four days are required when bed rest alone is used. Water-sealed drainage prevents the fatal complication of tension pneumothorax, which can develop at any time. The leaking ruptured bleb, or whatever has caused the pneumothorax, will rapidly seal when the parietal and visceral pleura meet. Rapid re-

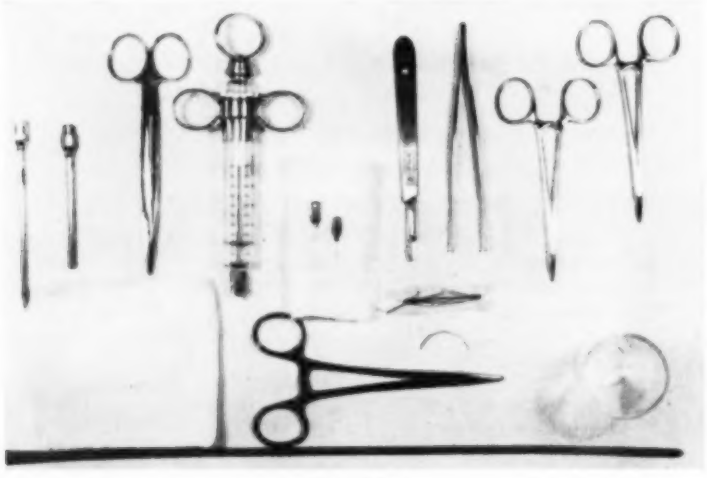

FIGURE 1

expansion of the lung will prevent the dreaded complication of captive lung, which eventually requires decortication.

FIGURE 2

SUMMARY

Eighty-four cases of spontaneous pneumothorax have been reviewed. In most instances, the cause is unknown, but when it is known, it is usually due to a ruptured bullus or emphysematous bleb. Spontaneous pneumothorax usually occurs during normal activities. The principal symptoms are pain and dyspnea. Symptoms are always present, so every case should be diagnosed. If untreated, spontaneous pneumothorax can be fatal, and the cause of death is usually tension-pneumothorax. If no treatment is administered other than bed rest, the time required for full expansion averages 34 days. If the chest catheter plus water-sealed drainage is used, the average time for re-expansion is three days. For this reason, it is recommended that all cases of spontaneous pneumothorax who have 50 per cent or more collapse of the lung should be treated by catheter, water-sealed

drainage. A simple technique for establishing catheter, water-sealed drainage has been described.

Acknowledgment is given to the White Memorial and Los Angeles County Harbor General Hospitals for permission to include patients in our study.

RESUMEN

Se estudian ochenta y cuatro casos de neumotorax espontáneo. En la mayoría de los casos la causa es desconocida, pero cuando ésta se averigua, generalmente se debe a ruptura de ampollas enfisematosas. El neumotorax espontáneo ocurre generalmente durante actividades normales. Los síntomas principales son dolor y disnea. Los síntomas siempre se encuentran, por ello todos los casos deben diagnósticarse. Si no se trata, el neumo espontáneo puede ser fatal y la causa de la muerte puede ser el neumotorax hipertensivo. Si no se usa otro tratamiento que el reposo en cama, el tiempo que tarda para la expansión completa es por término medio de 34 días. Si el cateter instalado con válvula de agua se emplea, el tiempo medio para la expansión es de tres días. Por esta razón es de recomendarse que todos los casos de neumo espontaneo que tienen 50 por ciento o mas de colapso del pulmón se traten con este metodo. Se describe una técnica sencilla para establecer el método.

RESUME

Les auteurs ont passé en revue 84 cas de pneumothorax spontanés. Dans la plupart des cas, la cause en reste inconnue. Quand on la connait, il s'agit habituellement de la rupture d'une bulle ou d'une vésicule d'emphysème. Le pneumothorax spontané survient généralement durant l'activité normale. Les symptômes principaux sont la douleur et la dyspnée. Les signes existent toujours, et tous les cas devraient être diagnostiqués. S'il n'est pas traité, le pneumothorax spontané peut être mortel et la cause de la mort est alors l'hyperpression intra-pleurale. Si le malade n'est traité que par le repos au lit, la réexpansion n'a lieu que dans un délai moyen de 34 jours. Si l'on pratique une aspiration, la moyenne du temps nécessaire à la réexpansion ne dépasse pas trois jours. C'est pourquoi il est recommandé d'utiliser l'aspiration dans tous les cas de pneumothorax spontanés dans lesquels 50% ou plus du poumon se trouve collabé. Les auteurs décrivent une technique simple pour pratiquer l'aspiration intra-pleurale.

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Rehabilitation of the Tuberculous*

Two-year Observations on a Group of Ambulatory Patients in a Tuberculous Hospital

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Physicians treating tuberculosis are becoming increasingly aware that for many patients definitive medical and surgical care alone is not sufficient for total rehabilitation. Since so many emotional, social and economic factors complicate long term medical care, attention to all aspects of treatment is essential for most effective results. To stimulate further interest in the rehabilitation of the tuberculous, the authors were prompted to make a study of a group of ambulatory patients during the final months of their hospitalization when the disease was becoming inactive and they were increasing their physical activity.

The over-all aim of our program is to help patients re-adjust to their family and community while preparing them for ultimate employment with minimal risk of relapse. This study describes the various methods used to achieve these aims and the results obtained with a limited number of ambulatory patients. It also shows how the various rehabilitation activities and ancillary services helped these patients attain their chosen vocational goals.

During a two year period, 57 patients were studied. They were selected at random from the pre-discharge ward. Their disease on admission to the hospital was either moderately or far-advanced. After a period of effective treatment on the infirmary and semi-infirmary wards, their disease became inactive§ so that these patients were transferred to the pre-discharge ward. All had a prescribed work capacity§§ of at least two hours, exclusive of activity involved in self-care and recreational activities. Their ages ranged from 23 to 45 years. The average hospital stay was about one and one-half years including the four to five month period on the pre-discharge ward.

The data presented in Table I indicates where our patients went upon completion of their medical treatment at Castle Point. Four returned directly to their former (clerical) jobs. Six went back to their families for

*From the Veterans Administration Hospital, Castle Point, New York, Dr. John K. Deegan, Chief of Professional Services. Reviewed in the Veterans Administration and published with the approval of the Chief Medical Director. The statements and conclusions published by the authors are the result of their own study and do not necessarily reflect the opinion of the Veterans Administration.

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§Inactive refers to the National Tuberculosis Association Classification (1950); i.e., those patients who for at least six months have had chest x-ray films revealing a stabilized lesion with no cavity and a negative sputum by culture. Symptoms of tuberculosis must be absent.

§§Physical (work) capacity refers to ability of patient to engage in specific activity for a stated interval of time, without any harmful clinical effects.

TABLE I: VOCATIONAL GOALS ACHIEVED BY 46 PATIENTS DISCHARGED FROM THIS HOSPITAL

Total number of patients in group	57
Number completing program	46
Number not completing program	11
1. To college	12
2. Trade, technical or business school	10
3. To home (family)	6
4. To rehabilitation center or workshop	5
5. To work directly	4
6. On-the-job training	5
7. State Division of Vocational Rehabilitation	4

a brief period of convalescence prior to seeking employment. On-the-job (apprenticeship) training was selected by four. Several went to certain Rehabilitation Centers and Workshops for a brief period of specialized training not yet available at this treatment hospital. For example, M.C., prior to his illness had attended a tailoring school in New York City and after leaving Castle Point, he entered a Workshop[2] which specialized in manufacture of women's apparel. Here, his hospital-established work capacity of four hours was gradually increased under close medical supervision. In this way, he was better prepared to take on a full-time job in the garment industry. Another, J.Q., went to the Veterans Administration Rehabilitation Center, Oteen, North Carolina[3] to receive specialized training in dental mechanics which was his chosen vocational field.

Most of the service-connected ex-patients went to the Veterans Administration Regional Offices nearest their homes for approval of their chosen vocational plans in accordance with various Federal laws for veterans benefits. The Regional Office Physician receives the hospital medical and counseling data which help him decide the amount of work these patients can safely do on the outside. Those with non-service connected disabilities were referred to the State Division of Vocational Rehabilitation for further assistance.

TABLE II

Total number of patients in group	57
Number completing program	46
Number not completing program	11
Irregular discharge (Sign Outs)	3
Transfer to infirmary ward	4
"No benefit" (?), dropped voluntarily	4

This study is not primarily concerned with the irregular discharge (sign out) rate at Castle Point; however, Table II shows the relatively low incidence of irregular discharges for this group as compared with the much higher percentage for the general patient population. In our opinion, the fact that all of these patients had an excellent prognosis plus their intensive participation in rehabilitation activities and the likelihood of an early approved discharge are some of the factors which motivated these patients to remain for the full term of treatment. During the two year

period of observation only four (7 per cent) of the total of 57 had reactivation of their disease (Table II). It is difficult to determine to what extent, with the multiplicity of factors involved, work done in the Physical Medicine and Rehabilitation Sections was related to reactivation. Four discontinued their rehabilitation activities despite all efforts to give them "the drive to accomplish their own rehabilitation."

Patient Activities in Physical Medicine and Rehabilitation Sections

The in-hospital program includes activities in the Physical Medicine and Rehabilitation Service as well as individual and group counseling given by the ancillary services and vocational adviser. This Service consists of four sections: Manual Arts Therapy, Educational Therapy, Physical Therapy, and Occupational Therapy. These sections are staffed by trained therapists under medical supervision. By the time the patients reach the pre-discharge status they require little definitive medical and surgical care. The urgent need is to channel their energies and leisure time into purposeful activities related to their future plans.

Most of the patients in this study group have been engaged in Manual Arts Therapy and Educational Therapy. Since the place of these two therapies in a total rehabilitation program is not so well known as that of Physical Therapy and Occupational Therapy, a brief description of the former two therapies is given. Educational Therapy offers academic and commercial courses. The latter include typing, bookkeeping and shorthand, while the academic courses include English, foreign languages, science, history and mathematics with special emphasis on remedial reading and study habits regimes. A patient may work for a high school diploma or its equivalent or he may engage in college courses for advanced credit at the institution of his own choice. Manual Arts Therapy provides guides for evaluation of work capacity and exploration in basic vocational areas such as printing and photography, light bench work, machinist occupations, radio and electronics and linotyping. A Light Mechanics course offers training in a wide variety of related occupations; e.g., repair of precision electrical devices, precision assembly, meter and instrument repair, and watch and camera repair. The course is not designed as a specific preparation for any one occupation but rather for the acquisition of basic skills and techniques for many related occupations dealing with precision machine and hand-tool operations.

A few patients have worked in the various hospital departments, such as x-ray, clinical laboratory and administrative offices. These patients are given a chance to try out different kinds of work in line with their interests, skills and experiences. Their work performance has also helped in evaluation of their prescribed work capacity.

Vocational Planning

The choice of patient activities depends upon the vocational goals set by joint planning of the patient, the vocational adviser and the ward phys-

ician. These goals have been tentatively established during the early period of his hospitalization. Certain complex problems which cannot be resolved between the patient and our vocational adviser are discussed at a monthly Rehabilitation Board conference.[4] This conference is usually attended by the physician, vocational adviser, clinical psychologist, social worker, ward nurse and rehabilitation therapist. The conference's recommendation is presented to the patient, who makes the final decision. With medical approval, a member or members of the Physical Medicine and Rehabilitation Service are assigned to carry out this program. At subsequent monthly conferences, the original plan may be reviewed and altered, if necessary, to meet any changing needs. The ward physician is thus continually informed of the patients' vocational plans so that their rehabilitation activities may fit into the current medical and surgical program.

Responsibility of Physician in Determining Level of Work Capacity

The supervising physician decides on the amount of work each patient is able to do, based on the combined information derived from several sources. The latter include the study of serial chest x-ray films and results of sputa tests as well as the recorded observations made by the therapists and ward nurse. The patient's personality and intellectual make-up as well as any co-existing non-pulmonary disorders are also noted. If there are no ill-effects from the current prescribed activities, the work prescription is increased one hour each month. As a rule, most of our patients have a four hour work capacity level by the time they are ready for hospital discharge.

Role of Ancillary Services

Recognizing the patient's need for adequate post-hospital adjustment, we utilize the services of the social worker and the staff psychologist to help our patients deal with any social or emotional problems created by their homecoming.

Patients in this group meet regularly with the staff psychologist. These bi-weekly group therapy sessions serve a two-fold purpose. Patients are encouraged to talk freely on such topics as "Control of Anxiety," "Marriage and the Tuberculous Patient," or on any other subject they choose to discuss. Another value of these sessions is that patients discover that others in this group have difficulties similar to their own. While no final answers may be provided, these group discussions help patients to understand their problems more clearly.

Role of Hospital Social Worker

The hospital social worker plays an important part as a member of the rehabilitation team. Her role is to evaluate with these patients, on an individual basis, any of their unresolved problems and to help them deal with these problems in practical ways. Prolonged separation from family members may have weakened important personal relationships and made very difficult for them the task of adjusting to a post-hospital regimen.

Certain patients fear facing the realities of their return to community living. They hesitate to resume active participation in the outside world and prefer to cling to the protective atmosphere of the hospital. Although they have been eagerly looking forward to discharge, they experience mixed feelings about leaving the hospital.

It is during this period of uncertainty that the social worker can help these individual patients to express their concerns over difficulties most likely to be faced during their post-hospital adjustment period. For example, they may wonder whether they will be welcomed back into their family circle, and whether their wives and children will show them as much affection as formerly. Will their neighbors accept their homecoming or shun them? Will they be able to continue on the outside a life of restricted activity? And later, will they get their old job back again or, if need be, will they be able to "switch over" to a less strenuous job as their doctor suggested? Since single patients must plan their lives independently, they are apt to fear assuming total responsibility for their own well being. Many patients express fears of another breakdown.

The social worker offers help at a time when these problems take on great significance. By permitting patients to give expression to their inner conflicts or regrets, they are helped to regain self-confidence. If they desire further assistance, they are referred to the Veterans Administration Regional Office social service or to a community agency equipped to help them.

Post-Hospital Regimen to Control Preventable Relapses

The services of the social worker and staff psychologist are supplemented by frequent talks given by the physician. Despite the recent advances in the treatment of tuberculosis, too many patients relapse following discharge from the hospital. In an effort to control preventable relapses, the physician discusses with patients certain well recognized principles of post-hospital living. They are taught to understand their physical limitations and to regulate their hours of work, rest and recreation accordingly, especially during the immediate post-hospital period. Those patients planning to go to school are urged to limit their study schedule and to reside in or near the college to avoid transportation problems. They are told to keep away from jobs involving physical exertion or prolonged exposure to harmful dusts and irritating fumes. Through this type of orientation, they may lessen their chances of relapse.

Many patients in this group have returned to full-time work within six months after leaving the hospital. We have found, as have others, that an undue lag between hospital discharge and job tends to undo the benefits derived from our rehabilitation program and often makes for increasing dependency on family finances and disability pensions.

The case history of J.W., age 28, shows the need for proper understanding of the limitations imposed by one's disability. After a period of hospitalization the disease was arrested. In spite of his physical limitations, J.W.,

one month after his discharge, took on a full time job as a salesman making door-to-door visits. Several months later, he changed his job to one requiring moving heavy wooden doors in a lumber factory. While working at this job he enrolled in a technical course at an evening school to prepare himself for a job in an aviation plant. After completion of the course he found employment in an aviation plant, where, in order to earn more money, he worked up to 54 hours a week. A routine medical check-up revealed reactivation of the disease which brought the patient back to Castle Point Hospital.

Vocational Counseling

The vocational guidance of patients is an essential rehabilitation complement to the medical, social, and psychological phases of our program. The vocational adviser plays an important role in helping the patient to "adjust to a post-hospital world."[5] He conducts informal discussions one hour each week. The answers to the following types of questions form the basis for group discussions: "I was a hotel bell-hop before I got sick. What kind of less strenuous job can I take after leaving the hospital?" "Do employers still hesitate to hire patients who have recovered from tuberculosis?" "Now that I am well, can I return to my former job as electrical welder where I am constantly exposed to injurious fumes?" "Ought I go to college or take on-the-job training?" "How do I fill out a job application?" "How do I go about getting a job?"

These group discussions are supplemented by intensive counseling given individually to patients during the final period of hospitalization, when emphasis shifts from medical care to post-hospital career plans. While in the infirmary ward, each patient had been initially interviewed by the vocational adviser to determine the need for any future counseling. It was found that two-thirds of the entire group required intensive vocational counseling and that the remainder could safely return to their previous jobs or continue with their schooling. Counseling services were rendered to 38 out of the 57 patients studied, 32 of whom made a decision as to their future plans. Twelve patients with no occupational experience or with former occupations now deemed medically unsuitable were benefited. Standard vocational guidance procedures were used to work out with each patient the type of work for which he is best fitted in view of his total background and assets; e.g., interest, abilities, aptitudes, vocational experience and personality. Certain complex problems, which cannot be solved by joint consultations of the patient, the adviser and the physician, are presented at a staff Rehabilitation Board conference for a group attempt at solution. In all instances, the patient makes his own decision.

Field Trips by Patients to Nearby Industrial Plants

The vocational adviser conducts field trips for patients to nearby factories. The main purpose of these visits is to show the wide variety of employment opportunities available to ex-patients in these business establishments. These trips provide patients with practical occupational information and

serve to clarify the meaning of selective job placement. Besides their educational value, the tours to these industrial plants serve as an initial contact between the hospital and the outside working world. After each trip the application of what has been seen is related to each patient's vocational objective through discussion led by the vocational adviser.

The case history of J.B. illustrates the practical value of these trips. He had been ill with bilateral disease for two years. After chemotherapy had controlled the disease in his left lung, a resection was successfully performed for a cavity in the right upper lobe followed by a space-filling thoracoplasty. After admission to this pre-discharge group and during one of these guided tours, he felt greatly encouraged to learn that despite his severe shortness of breath, he could soon be employed as a precision instrument repairman. This was in line with his chosen vocational objective. As a result of these field trips, other patients found out that there are full time jobs they could satisfactorily perform despite their breathing difficulties.

Effect of Newer Methods of Treatment on Program

It is of interest to note that as a result of the beneficial effects from the use of chemotherapy and antibiotics alone or combined with chest surgery, the disease has often been brought under control sooner, thereby shortening the period of disability and hospitalization. Clinical improvement has proceeded at a faster rate so that such patients are referred to our Rehabilitation Service earlier than previously. These newer methods of treatment combined with our planned rehabilitation efforts have made it possible for these fully recovered patients to return sooner to their family and community with good prospects of eventual employment.

Difficulties Encountered

Some of the difficulties encountered in this study deserve brief mention. The problem of motivation is an important one. Certain patients have resisted our most persistent efforts to interest them in rehabilitation activities. The "custodial type" as well as certain immature patients with no sense of responsibility have been difficult to motivate. The selection of patients most likely to benefit from our vocational rehabilitation program has not been easy at times. A difficulty, no longer so commonly encountered, is the ward physician's lack of interest in rehabilitation.

SUMMARY

In a two-year study, 57 tuberculous patients have been engaged in a rehabilitation program started in the infirmary wards and intensified during the final period of hospitalization. The need for such a service is essential since for many patients definitive medical and surgical care alone is not sufficient for total rehabilitation. As a result of the newer treatment methods used in this hospital, the disease is often brought under control sooner and more patients are referred to the rehabilitation service much earlier.

An analysis of the vocational goals achieved by 46 of the total 57 ambulant patients completing this program is presented. The patient activities in Educational Therapy and Manual Arts Therapy depends in large part on the rehabilitation goals set by joint planning of the patients, vocational adviser and ward physician with the ancillary services playing an important part. The study shows how the social worker and the staff psychologist promote better post-hospital adjustment by helping patients to understand their social and emotional problems more clearly. The role of the vocational adviser is stressed. His services include group discussions, individual counseling, and application of standard guidance procedures. He conducts field trips to nearby industrial plants to acquaint patients with the wide variety of job opportunities available to them despite their pulmonary handicap.

This study also shows how the physician estimates the work capacity of patients and how this is gradually built up to permit return to work or school with minimal risk of reactivation. Best results are obtained when the physician correlates the various rehabilitation activities and makes them an integral part of total medical care.

RESUMEN

Este es un estudio en el que se consideran 57 enfermos de tuberculosis que habían sido conducidos dentro de un programa de rehabilitación, que principió desde las salas del hospital y se intensificó durante el período final de su hospitalización. La necesidad de tal servicio es esencial, puesto que para muchos enfermos no bastan los cuidados médicos y quirúrgicos para la total rehabilitación. Como resultado de los nuevos métodos de tratamiento usados en este hospital, la enfermedad, es más pronto dominada y más enfermos son enviados al servicio de rehabilitación mucho más pronto.

Un análisis de los objetivos vocacionales alcanzados en 46 de 57 enfermos ambulatorios que terminaron el plan, se presenta aquí. Las actividades del enfermo en terapia educacional y terapia por las artes manuales, dependen en gran parte de los objetivos de rehabilitación planeados en conjunto para los enfermos, para lo cual desempeña un papel importante el consejero vocacional, el médico de sala y los servicios auxiliares. El estudio muestra cómo el trabajador social y el psicólogo del servicio, promueven un ajuste mejor a la salida del hospital ayudando al enfermo a comprender sus problemas sociales y emocionales con mayor claridad. El paper del consejero vocacional se recalca. Sus servicios comprenden discusiones en grupo, consejo individual y aplicación de procedimiento de rutina para guía. Conduce visitas a fuera hacia las plantas industriales cercanas para familiarizar al enfermo con los trabajos diversos que puede haber a su disposición a pesar de su desventaja pulmonar.

Este estudio también muestra como los médicos estiman la capacidad de trabajo de sus enfermos y como es gradualmente acrecentada hasta permitir el retorno al trabajo o a la escuela, con riesgo mínimo de reactivación. Los mejores resultados se obtienen cuando el médico correlaciona las diversas actividades de rehabilitación y las hace parte integral del cuidado médico total.

RESUME

Dans une étude portant sur deux ans, l'auteur présente 57 malades tuberculeux qui ont été soumis à un programme de réadaptation dont le début se fit dans l'hôpital et fut intensifié durant les derniers temps de l'hospitalisation. Le besoin d'une telle institution est essentiel, puisque pour beaucoup de malades, les soins médicaux et chirurgicaux à eux seuls ne suffisent pas à permettre la réadaptation parfaite. Le résultat des nouvelles méthodes thérapeutiques utilisées dans cet hôpital fait que la maladie est souvent vue à son début et que beaucoup de malades peuvent être pris en charge beaucoup plus tôt par le service de réadaptation.

L'auteur présente le compte-rendu des résultats professionnels obtenus chez 46 des 57 malades traités ambulatoriement. Les occupations des malades dans le centre d'Education et de Travail manuel dépendent pour une large part des buts de la réadaptation. Le programme en est mis au point en tenant compte des désirs du malade, et des avis du conseiller technique du travail, du médecin traitant et du personnel. Cette étude montre combien les services d'assistantes sociales, et la personne chargée de l'étude psychologique du malade ont un rôle favorable pour permettre l'adaptation à la sortie de l'hôpital. Ils agissent en permettant au malade de comprendre plus clairement les problèmes sociaux et psychiques qui les concernent. Les auteurs insistent sur le rôle de conseiller technique du travail. Son activité comprend des discussions de groupe, des conseils personnels, et l'application des procédés standard d'orientation. Il doit poursuivre des tournées dans les régions et les entreprises industrielles voisines, pour mettre les malades en contact avec la plus grande variété d'activités possibles pour eux malgré leur atteinte pulmonaire.

Cette étude montre également comment le médecin doit estimer la capacité de travail chez les malades, et comment on amène progressivement la reprise du travail ou des études avec le minimum de risque de rechute. De meilleurs résultats sont obtenus quand le médecin coordonne les différents éléments de la réadaptation et les intègre parfaitement dans le cadre de la totalité des soins médicaux.

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Ward Rounds — "Hemoptysis"*

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Hemoptysis implies tuberculosis to the average medical student. Somehow an effort must be made to acquaint him with the many other diagnostic possibilities of "the bloody alarm". An academic list of causes is boring. It has been our experience that listing them by student participation leaves a lasting impression.

No individual student has had sufficient training or experience to think of the entire list of diseases in which hemoptysis may occur. However, the collective knowledge of even a small group of students can, and does quite regularly, produce 50 or more diagnostic possibilities. To develop such a list on a competitive basis makes for enjoyable and stimulating ward rounds and emphasizes to each student the many causes of hemoptysis.

Ward rounds begin with the presentation of a patient whose chief complaint is "hemoptysis". The word is in quotations because the lungs are not necessarily the source of expectorated blood. That in itself is worth emphasizing.

We then ask each student to suggest a cause for the patient's hemoptysis. A list is kept on the blackboard.

Repeated circulation through the group exhausts the ideas of some of its members, but their associates continue to add more diagnoses to our list. These, in turn, suggest new ideas to the others. Each student in the group is stimulated to think of many more diagnoses than occurred to him when confronted with a patient with the symptom. This is what the rounds are designed to accomplish.

In the course of the presentation, the gamut of pulmonary pathology is nearly run. Many entities are unfamiliar to some of the students, stimulating questions from them. A valuable introduction to previously unfamiliar pulmonary states is thereby made.

Finally the major causes of hemoptysis are underlined and their relative frequency briefly emphasized.

The list recorded below is our record number of causes of hemoptysis suggested by one group on rounds. These students were pleased with their accomplishment and have subsequently inquired whether this list has been equalled or excelled. Such continued interest and recollection of the rounds by the student is proof of the success of the teaching session.

This same procedure is applicable to the differential diagnosis of any presenting symptoms.

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The Departments of Medicine of the University of Buffalo School of Medicine and the Buffalo General Hospital.

1. Tuberculosis
2. Carcinoma, lung
3. Metastatic carcinoma
4. Bronchiectasis
5. Bronchitis
6. Broncholithiasis
7. Broncho-esophageal fistula
8. Bacterial pneumonia
9. Lung abscess
10. Lung cyst
11. Silicosis
12. Pulmonary sarcoma
13. Chemical pneumonia
14. Trauma (bronchial)
15. Trauma (external)
16. Cardiac disease
17. Bronchial adenoma
18. Viral pneumonia
19. Broncho-pleural fistula
20. Fractured rib
21. Pulmonary adenomatosis
22. Hemorrhagic diathesis
23. Suppurative lymph node discharging into bronchus
24. Dermoid cyst
25 Nosebleed
26. Carcinoma laryngeo-pharyngeal area
27. Malingering
28. Esophageal varices
29. Gastric hemorrhage
30. Tuberculous pharyngitis
31. Bleeding gums
32. Hamartoma and other benign lung tumors
33. Mediastinal tumors
34. Lymphoma
35. Boeck's Sarcoid
36. Lipoid pneumonitis
37. Aspiration pneumonia
38. Pneumatocele
39. Foreign body
40. Asthma
41. Emphysema
42. Loeffler's syndrome
43. Pulmonary agenesis
44. Sinusitis
45. Endobronchial polyp
46. Bronchial ulcer
47. Pulmonary infarct
48. Bronchial endometriosis
49. Diaphragmatic hernia
50. Histoplasmosis
51. Aortic aneurysm
52. Arterio-venous fistula
53. Bagasse disease
54. Echinococcus
55. Post-concussion syndrome
56. Post-operative
57. Tracheal osteoma
58. Cocidioidomycosis
59. Blastomycosis
60. Actinomycosis
61. Atalectasis
62. Bronchostenosis
63. Moniliasis
64. Hodgkin's disease
65. Sporotrichosis
66. Neurofibroma involving wall of bronchus
67. Primary pulmonary hypertension
68. Idiopathic

An Invitation from Spain!

XIII CONGRESS OF THE INTERNATIONAL UNION AGAINST TUBERCULOSIS

MADRID, SPAIN, SEPTEMBER 26 - OCTOBER 2, 1954

III INTERNATIONAL CONGRESS ON DISEASES OF THE CHEST

American College of Chest Physicians

BARCELONA SPAIN, OCTOBER 4-8, 1954

Third International Congress on Diseases of the Chest

BARCELONA, SPAIN

OCTOBER 4-8, 1954

Plans have been completed to hold the III International Congress on Diseases of the Chest, sponsored by the Council on International Affairs of the American College of Chest Physicians, in Barcelona, Spain, October 4-8, 1954.

Dr. Luis Rosal, Governor of the College for Barcelona, has been appointed President of the Congress. Professor Anthony Caralps of Barcelona, has been designated Secretary General, and Dr. Francisco Coll Colome of Barcelona, has been appointed Treasurer of the Congress.

Meetings and conferences were held recently in Madrid and Barcelona with officials of the College to discuss the arrangements for the congress. Barcelona, situated on the Mediterranean Sea, is one of the most beautiful and interesting cities of the world. It is the pride of Spain, rich in its culture, art, and spiritual values. Barcelona extends a cordial invitation to the Fellows and members of the American College of Chest Physicians throughout the world to visit their lovely city and to participate in this III International Congress on Diseases of the Chest.

It is expected that delegates from more than 50 countries will attend the Congress in Barcelona and participate in the scientific assembly. All aspects of diseases of the chest will be discussed at this congress including tuberculosis (medical and surgical aspects), cardiology (medical and surgical aspects), non-tuberculous diseases of the chest, including tumors, both malignant and non-malignant, bronchiectasis, and the pneumoconioses. Special attention will also be given to studies on cardio-respiratory function. There will also be panel discussions in addition to the presentation of formal papers on all the above mentioned subjects. Physicians who wish to participate in the program should send at once, via air mail,

COLLEGE OFFICIALS IN SPAIN

Left to right—Jose Abello, Governor of the College for Madrid; Luis Rosal, Governor of the College for Barcelona and President of the III International Congress; Murray Kornfeld, Executive Director of the College; A. Crespo Alvarez, Regent of the College for Spain and President of the International Union Against Tuberculosis.

COLLEGE CONFERENCES IN SPAIN

Top—Members of the Barcelona Chapter of the College.
Center—Professor Anthony Caralps presenting report to the Executive Committee of the Barcelona Chapter.
Bottom—Members of the Madrid Chapter of the College.

the title of their paper and a brief abstract to Doctor Andrew L. Banyai, Chairman, Council on International Affairs, American College of Chest Physicians, 112 East Chestnut Street, Chicago 11, Illinois, for the consideration of the committee. The official languages for the Congress will be Spanish, French, and English.

There will be a special section in the Congress dealing with motion pictures. Physicians who wish to present motion pictures at the Congress should send the title and a brief abstract of their film to the Executive Offices, American College of Chest Physicians, 112 East Chestnut Street, Chicago 11, Illinois, with the following information:

length of film (running time)
color or black and white
silent or sound
8mm or 16mm.

The third section of the Congress will deal with scientific and technical exhibits. Physicians who wish to participate in this section should send complete information to Professor Anthony Caralps, Secretary General of the Congress, Platon, 1, Barcelona, Spain.

Special events, including bull fights and native dancers and singers are being planned for your entertainment. Tours to places of interest in and around Barcelona are also being arranged by the local committees.

Physicians who are interested in attending the Congress should write to the Executive Director of the College in Chicago stating the number of persons who will be in their party and the type of accommodations they will require. Complete information concerning the Congress will be sent upon request. Please address all inquiries to the Executive Director, American College of Chest Physicians, 112 East Chestnut Street, Chicago 11, Illinois, U.S.A.

THIRD CONGRESS, INTERNATIONAL BRONCHOESOPHAGOLOGICAL SOCIETY

The Third Congress of the International Bronchoesophagological Society will be held in Lisbon, Portugal, October 11-13, 1954. Dr. Andre Soulas, Paris, France, is President of the Society and Dr. Chevalier L. Jackson, Philadelphia, Pennsylvania, is the Executive Secretary-Treasurer. For further particulars concerning the Congress, please write to Dr. Chevalier L. Jackson, 3401 North Broad Street, Philadelphia, Pennsylvania, U.S.A.

Interim Session

AMERICAN COLLEGE OF CHEST PHYSICIANS

St. Louis will be host to the Interim Session of the American College of Chest Physicians on November 29 and 30. The Missouri Chapter of the College will sponsor a scientific program, cocktail party and dinner on Sunday, November 29, which will be held at the Sheraton Hotel. The program to be presented was published in the October issue of *Diseases of the Chest*. Physicians desiring to attend one of the three round table luncheon meetings are requested to send their selection by number to the College offices in Chicago as soon as possible; reservations should be accompanied by a check in the amount of $3.00 for each luncheon.

On Monday, November 30, the Board of Regents of the College will hold its semi-annual meeting at the Sheraton Hotel. The Clinical Meeting of the American Medical Association will be held in St. Louis, December 1 through 4, 1953.

Committee on Scientific Program

Dr. Edgar Mayer, Chairman, has announced that the following members have been appointed to the Committee on Scientific Program for the 20th Annual Meeting of the College to be held in San Francisco, June 17-20, 1954:

Herbert C. Maier, 3 East 71st Street, New York, New York—*Surgery*.

Arthur M. Master, 125 East 72nd Street, New York, New York—*Cardiology*.

Herman J. Moersch, Mayo Clinic, Rochester, Minnesota—*Experimental Medicine*.

Hurley L. Motley, 1212 Shatto Street, Los Angeles, California—*Physiologic Therapy and Function Studies*.

Arthur M. Olsen, Mayo Clinic, Rochester, Minnesota—*Non-Tuberculous Diseases of the Chest*.

Reginald H. Smart, 1135 West 6th Street, Los Angeles, California—*Occupational Diseases of the Chest*.

Harold G. Trimble, 2930 Summit Street, Oakland, California—*Tuberculosis*.

Physicians who wish to present papers on the program are requested to send the title of their paper, together with a 100-word abstract, directly to the committee member in charge of that particular subject, not later than January 1, 1954.

Dr. L. Henry Garland, 450 Sutter Street, San Francisco, California, will be in charge of the x-ray symposium to be presented. Physicians who have interesting films for presentation are requested to send their films to Dr. Garland, together with the case history.

1954 Prize Essay Contest

The 1954 Prize Essay Contest, sponsored by the Council on Undergraduate Medical Education of the College, is open to medical students studying for the degree of Doctor of Medicine. Essays may be submitted on any phase relating to the diagnosis and treatment of heart and lung disease. The instructions for the preparation of manuscripts are as follows:

1) Five copies of the manuscript typewritten in English (double spaced) should be submitted to the Committee on College Essay, American College of Chest Physicians, 112 East Chestnut Street, Chicago 11, Illinois, not later than March 15, 1954.

2) The only means of identification of the author shall be a motto or other device on the title page and a sealed envelope bearing the same motto on the outside enclosing the name and address of the author.

3) A letter from the Dean of Chairman of the Department of Medicine or Surgery of the medical school certifying that the author is a medical student studying for the degree of Doctor of Medicine.

The winner of the contest will be awarded a certificate of merit and a cash award of $250.00. The second and third prize winners will receive certificates of merit.

Members of the College are requested to bring this to the attention of undergraduate medical students.

Meeting of the Council on Pan American Affairs

The Regents and Governors of the American College of Chest Physicians in the Latin American countries will attend a meeting of the Council on Pan American Affairs to be held in Caracas, Venezuela, December 10, 1953, which is being held in conjunction with the Tenth Congress of the Union of Latin American Tuberculosis Societies meeting in Caracas, December 5 through 10. The Regents and Governors in the Latin American countries who have been invited to attend the meeting are:

REGENTS:

Argentina:	Gumersindo Sayago, Cordoba
Brazil:	Manoel de Abreu, Rio de Janeiro
Central America:	Amadeo Vicente Mastellari, Panama City
Chile:	Hector Orrego Puelma, Santiago
Colombia:	Carlos Arboleda Diaz, Bogota
Cuba:	Antonio Navarrete, Havana
Ecuador:	Juan Tanca Marengo, Guayaquil
Mexico:	Donato G. Alarcon, Mexico City
Peru:	Ovidio Garcia-Rosell, Lima
Puerto Rico:	Jaime F. Pou, Hato Rey
Uruguay:	Fernando D. Gomez, Montevideo
Venezuela:	Jose Ignacio Baldo, Caracas

GOVERNORS:

Argentina:	Raul F. Vaccarezza, Buenos Aires
Brazil:	Reginaldo Fernandes, Rio de Janeiro
	Orlando Cabral Motta, Belo Horizonte
	Jose Rosemberg, Sao Paulo
	Jose Silveira, Salvador
	Joaquim Cavalcanti, Recife
	Epilogo de Campos, Para
	Carlos Bento, Porto Alegre
Chile:	Gilberto V. Zamorano, Valparaiso
	Armando Alonso Vial, Santiago
	Ildefonse Garreton Unda, Concepcion
Colombia:	Rafael J. Mejia, Medellin
Costa Rica:	Raul Blanco Cervantes, San Jose
Cuba:	Teodosio Valledor, Havana
Dominican Republic:	J. M. Moscoso Cordero, Trujillo
Ecuador:	Jorge A. Higgins, Guayaquil
El Salvador:	Jose Francisco Valiente, San Salvador
Guatemala:	E. Coronado Iturbide, Guatemala City
Haiti:	Louis Roy, Port-au-Prince
Mexico:	Miguel Jimenez, Mexico City
Nicaragua:	Rene Vargas, Managua
Panama:	Augustin A. Sosa, Panama City
Paraguay:	Angel R. Gines, Asuncion
Peru:	Maximo Espinoza Galarza, Lima
Puerto Rico:	E. Martinez Rivera, Hato Rey
Uruguay:	Armando Sarno, Montevideo
Venezuela:	Julio Criollo Rivas, Caracas

Other members of the Council on Pan American Affairs of the College are as follows:

B. Guy Begin, Montreal, Canada
Juan M. Boettner, Asuncion, Paraguay

William J. Branday, Trinidad, B.W.I.
Antonio J. Brown, La Paz, Bolivia
Maximo Carrizo Villarreal, Colon, Panama
Richard Cory, Liguanea, Jamaica, B.W.I.
Carlos Gonzales B., San Salvador, El Salvador
Chevalier L. Jackson, Philadelphia, Pennsylvania, U.S.A.
Leopoldo Molinari, Lima, Peru
Antonio Rodrigues Diaz, Havana, Cuba

Dr. Jose Ignacio Baldo, Caracas, Venezuela, is Chairman of the Council on Pan American Affairs, and is also President of the Tenth Congress of the Union of Latin American Tuberculosis Societies.

The Council meets every two years with the ULAST Congress, at which time College activities in the Latin American countries are reviewed. There are fifteen chapters of the American College of Chest Physicians in the Latin American countries.

Interim Report

COUNCIL ON POSTGRADUATE MEDICAL EDUCATION

The Council on Postgraduate Medical Education of the American College of Chest Physicians is pleased to report that the Eighth Annual Postgraduate Course on Diseases of the Chest presented in Chicago, September 28 - October 1, 1953, had an enrollment of 92 physicians representing 24 states and 6 countries. Last year 62 physicians were enrolled for this postgraduate course.

The Sixth Annual Postgraduate Course on Diseases of the Chest was presented at the Hotel New Yorker, New York City, November 2 through 6, 1953 and at this writing the registration has closed at 115. Both the Chicago and New York postgraduate courses were sponsored by the Council on Postgraduate Medical Education of the College with the cooperation of the medical schools and hospital staffs in the respective cities.

A postgraduate course on diseases of the chest was presented in Pittsburgh in conjunction with the American Academy of General Practice of Western Pennsylvania; the sessions were held on four successive Sundays beginning September 13. An enrollment of 40 physicians was obtained at this first course given in Pittsburgh.

Future postgraduate courses in diseases of the chest are planned for New Orleans, February 15-19, 1954; San Francisco, February 19, 20 and 21, 1954; and in Philadelphia next spring, the dates to be announced later.

Dr. Alfred S. Dooneief, Bedford Hills, New York, has been appointed a member of the Council on Postgraduate Medical Education, to complete the unexpired term of Dr. Frank R. Ferlaino, New York City, whose untimely death occurred in September. Dr. Dooneief has been active in postgraduate medical education activities in New York City, having served as secretary of the committee in charge of arrangements for the College courses presented in New York City.

College Chapter News

PACIFIC NORTHWEST CHAPTER

The Annual Joint Meeting of the Pacific Northwest Chapter of the College and the Pacific Northwest Trudeau Society will be held at the University of Washington Medical School in Seattle November 13 and 14. The following scientific program, prepared under the Chairmanship of Dr. Cedric Northrop, Seattle, President of the College chapter, will be presented:

November 13:

9:00 a.m.: "Radioactive Gold in Malignant Pleural Effusion,"
Edward Morgan, Seattle.
Discussion: Simeon T. Centril, Seattle.

"Diagnostic Problems in Pleural Effusions,"
William S. Conklin and Gordon L. Maurice, Portland.
Discussion: James Speros, Portland.

"Pulmonary Resectional Failures,"
Fred Jarvis and Ralph Schlosser, Seattle.
Discussion: Elliott Harrison, Vancouver, B. C. and William S. Conklin, Portland.

Address: "Bacterial Resistance to Chemotherapeutic Agents in the Treatment of Tuberculosis,"
H. Stuart Willis, McCain, North Carolina.

Business meeting—College chapter.

12:00 noon: Luncheon meeting.
E. Harold Laws, Seattle, Chairman.
Address: Julius Wilson, Philadelphia, Pennsylvania.

2:00 p.m.: Pembine-Type Conference.
Consecutive cases from Firland Sanatorium—July, 1952,
Roberts Davies.

7:00 p.m.: Banquet—Hotel Edmond Meany, Marine Room.

November 14: John E. Nelson, Chairman.

8:30 a.m.: "Environmental Factors Affecting the Tuberculosis Problem,"
Norman Hawkins, B.S., Seattle.
Discussion: Thomas H. Holmes, Seattle.

"Echinococcal Disease of Lung,"
David Mowat, Vancouver, B. C.
Discussion: Elliott Harrison, Vancouver, B. C.

"Bronchospirometry,"
Karl K. Pump, Vancouver, B. C.
Discussion: F. C. Cline, Jr., Seattle.

"Pulmonary Fungus Diseases—A Symposium,"
Coccidioidomycosis—Norman Arcese, Seattle.
Histoplasmosis—Oscar A. Fodor, Seattle.
Mycologic Aspects—Frank C. Henry, Seattle.
Discussion: William M. M. Kirby, Seattle.

Address: "Visibility of Acid Fast Bacteria in Resected Specimens,"
H. Stuart Willis, McCain, North Carolina.

NEW JERSEY CHAPTER

The New Jersey Chapter will meet on Tuesday, November 24, at 8:30 p.m. at the Bonnie Burn Sanatorium in Scotch Plains. Dr. Herbert C. Maier, Director of Surgery, Lenox Hill Hospital and Visiting Surgeon, Bellevue Hospital, New York City, will speak on "Mediastinal Tumors." Dr. George M. Sommer, Thoracic Surgeon, St. Francis Hospital and Donnelly Memorial Hospital, Trenton, will lead the discussion.

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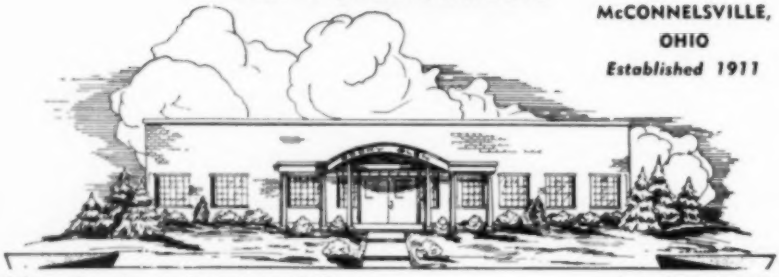

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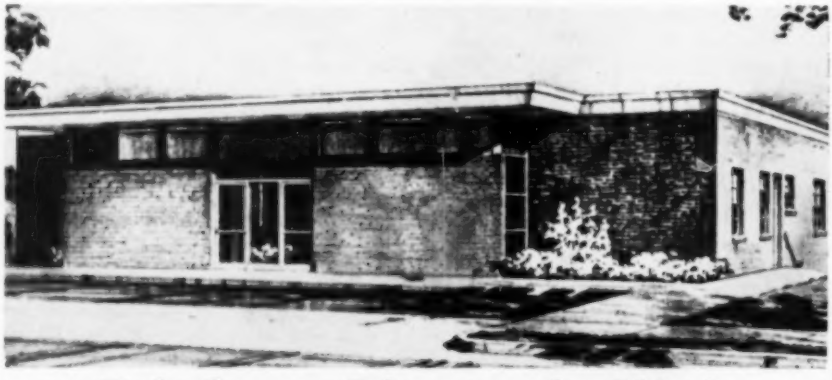

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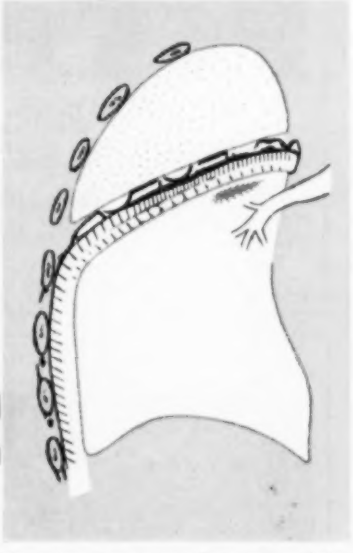

Extraperiosteal pneumolysis. Intercostal circulation preserved. POLYSTAN PLOMBE *in situ*.

Descriptive literature and complete bibliography available upon request.

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J. Lloyd Eaton, M.D., Oakland
H. Corwin Hinshaw, M.D., San Francisco
Gerald L. Crenshaw, M.D., Oakland
Glenroy N. Pierce, M.D., San Francisco
Donald F. Rowles, M.D., Oakland
James Kieran, M.D., Oakland
Robert Stone, M.D., Oakland
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Full time staff physician wanted in one of the most modern and best equipped tuberculosis hospitals in Midwest. Complete medical and surgical chest services. Large diagnostic chest clinic. State owned and operated. Near city with good medical school. Nice new one floor, three bedroom furnished home. Must be an American school graduate and eligible for state license. Experience desirable but not essential. Starting salary $6,600 yearly less rather nominal maintenance charge for self and members of family. Please address all inquiries to Box 274A, American College of Chest Physicians, 112 East Chestnut Street, Chicago 11, Illinois.

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COLLEGE EVENTS

NATIONAL AND INTERNATIONAL MEETINGS

Interim Session and Semi-Annual Meeting, Board of Regents, Sheraton Hotel, St. Louis, Missouri, November 29-30, 1953.

20th Annual Meeting, American College of Chest Physicians, San Francisco, California, June 17-20, 1954.

Third International Congress on Diseases of the Chest American College of Chest Physicians Barcelona, Spain, October 4-8, 1954.

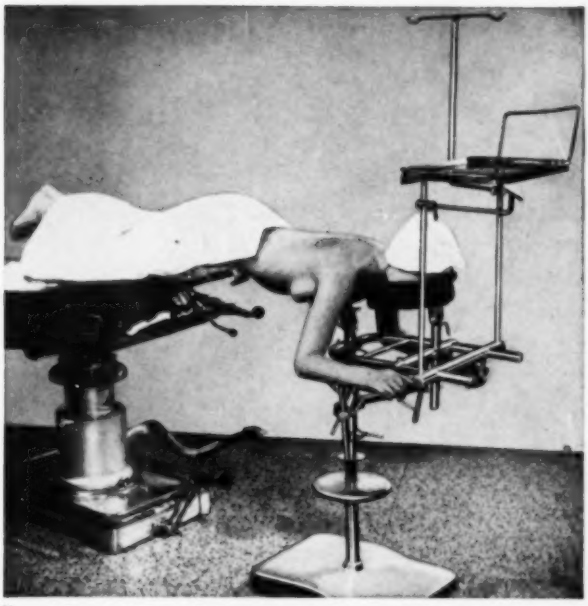
Tenth Congress of the Union of Latin American Societies Against Tuberculosis, Caracas, Venezuela, December 5-10, 1953.

Council on Pan-American Affairs, Caracas, Venezuela, December 10, 1953.

CHAPTER MEETINGS

Pacific Northwest Chapter, University of Washington Medical School, Seattle, November 13-14, 1953.

New Jersey Chapter, Bonnie Burn Sanatorium, Scotch Plains, November 24, 1953.



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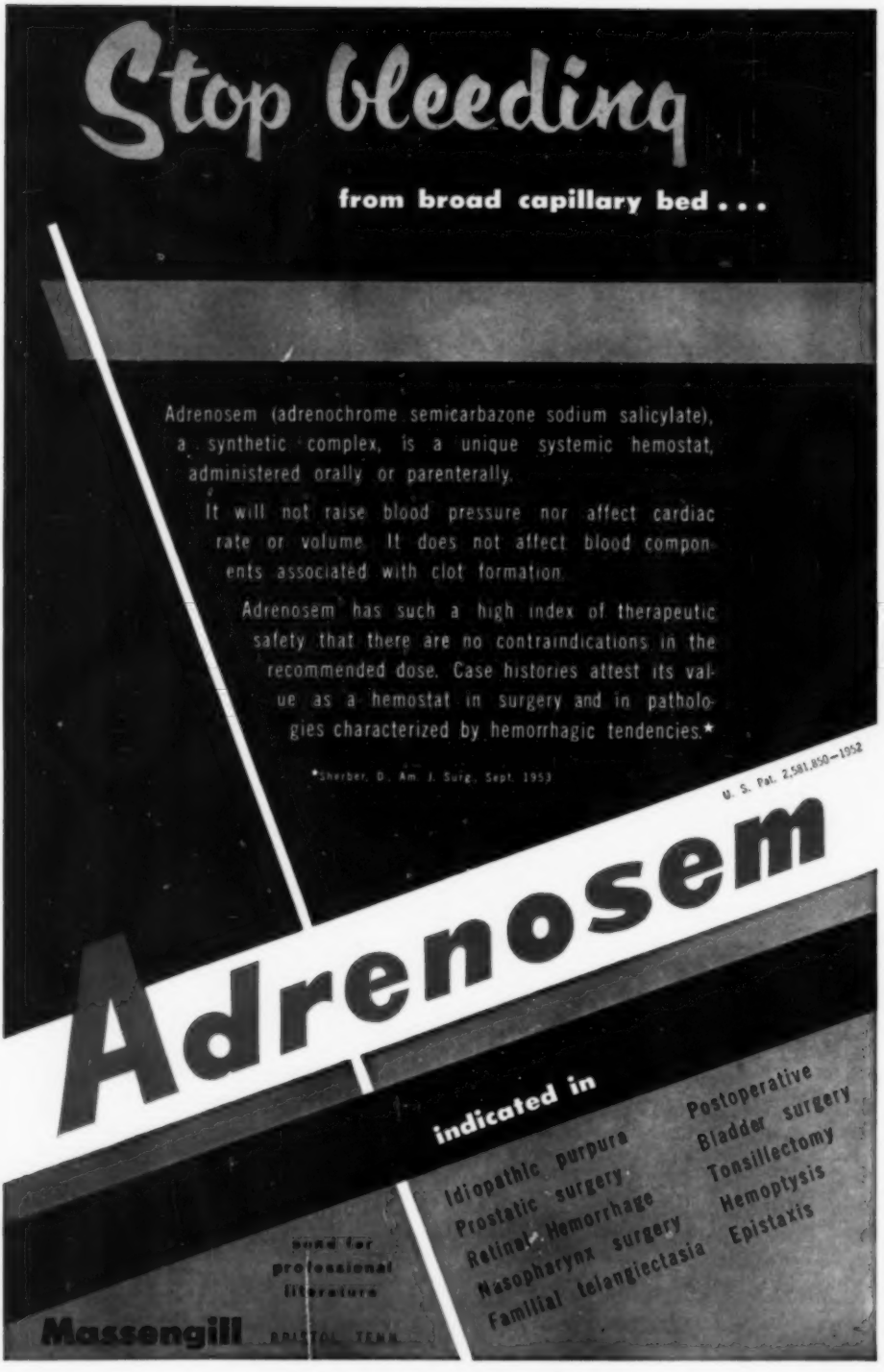
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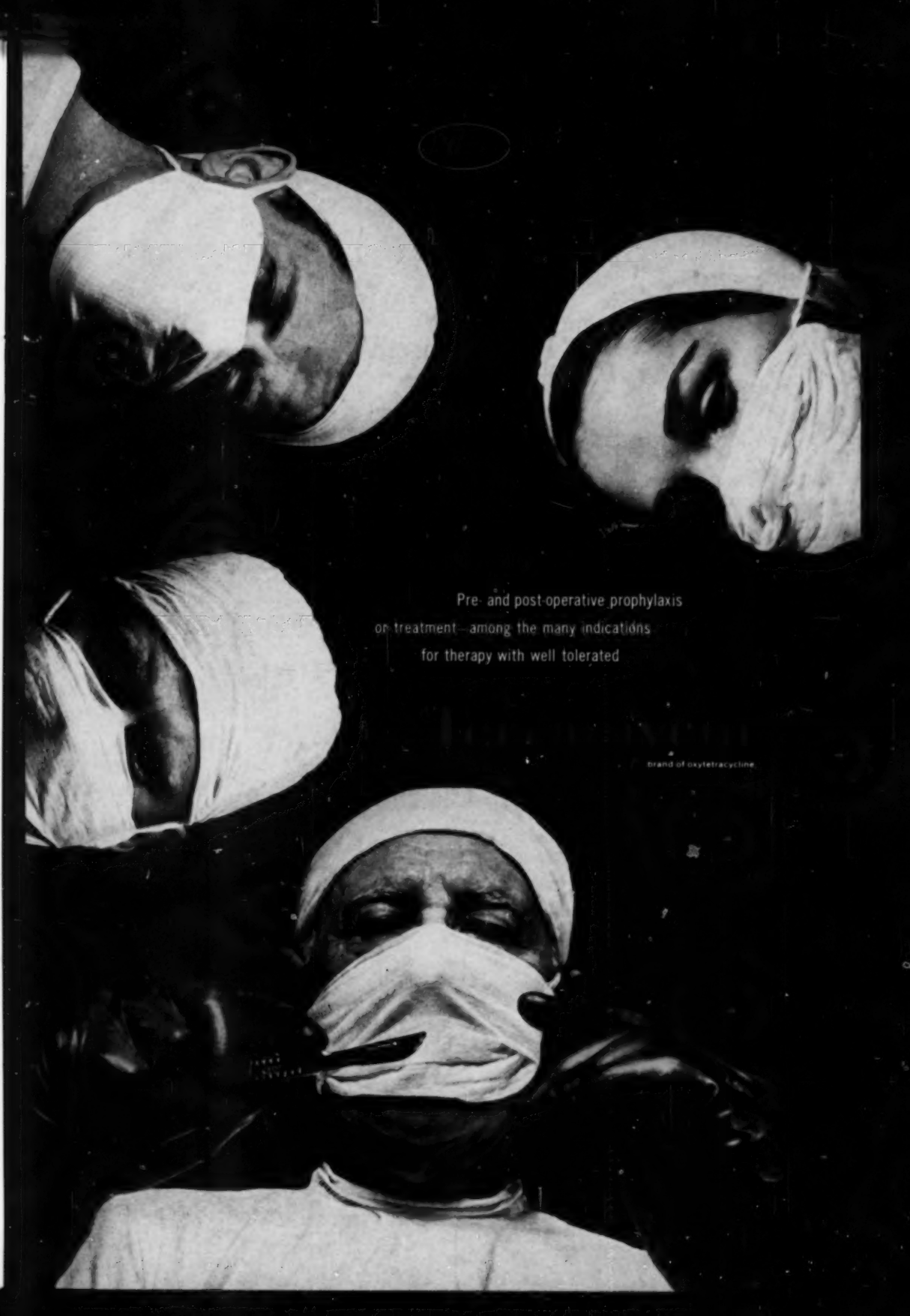
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16	8 Gm.	+ 200 mg.

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17 BUFFERED PARASAL-INH tablets replace 28¼ tablets (24 Sod. PAS 0.5 Gm. plus 4¼ INH 50 mg.) . . .

℞ **GREATER ECONOMY AND CONVENIENCE**

Because far fewer tablets are required, medication cost is correspondingly low . . .

℞ **VIRTUALLY PREVENTS GIs!**

The unique *buffer* incorporated in each tablet virtually prevents GI upset — even in cases intolerant to ordinary Sodium PAS and INH taken separately.

℞ **SODIUM AND SUGAR-FREE**

BUFFERED 'PARASAL'-INH is an effective, well tolerated, *single dosage form* for combined PAS-INH chemotherapy. Uncoated tablets are rapidly absorbed.

Buffered PARASAL®-INH

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